The Builder.

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Design for a Church near Preston, Lancashire.—Messrs. Clark & Hutchinson, Architects ..... *Single-Page Photo-Litho.*
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Bath Stone.—II.

ANALYSIS OF THICKNESS OF BEDS.

CONSIDERABLE doubt has hitherto prevailed as to the capabilities of the different Bath stone quarries of producing blocks of large size, and it has been more than once hinted that, when the better quality of stone falls short in that respect, inferior kinds are substituted. This we shall prove, by the following analysis, to be utterly without foundation. The thickness of each bed was measured as it stood in the quarry, so that allowances have to be made for shaping and getting the blocks ready for market. This, in general, would mean a reduction in thickness of from 3 in. to 4 in. from each bed. It must, of course, be remembered that the depth of beds, except in such areas as that at Westwood and Limpley Stoke, varies as the stone is dug into. All the same, it is believed that we have made a sufficient number of measurements in each area to warrant us in arriving at definite results in regard to the present and ultimate capabilities of each area. In this connexion it may be remarked that the 403 measurements shown as actually having been made do not represent all that were taken, as, where two headings, close together, were inspected and were obviously alike, we made one measurement do for both. In the table (Table No. 1) on the next page the numbers in the columns refer to the number of beds in the quarry; thus, in Quarry No. 1, there are six beds below 1 ft. in thickness, one bed between 1 ft. and 1 ft. 6 in. in thickness, and one bed between 2 ft. 6 in. and 3 ft. in thickness.

From the foregoing summary it will be observed that for beds of great thickness, between 6 ft. and 8 ft., the only areas available are Westwood and Limpley Stoke, and there is plenty of stone in both. This thickness is, of course, much in excess of ordinary requirements. It is noteworthy that in the Box area the majority of the beds are of medium thickness, from 2 ft. to 4 ft. In the Corsham area a large proportion are under 2 ft., the general range being from 1 ft. 6 in. to 2 ft. 6 in.; at the same time, beds over 4 ft. occur; and practically the same may be said of the Monk's Park area, though the extreme irregularity of the beds in certain of the quarries in the latter renders the average size of blocks a matter of uncertainty at times. A large number of the beds at Farleigh are under 2 ft., but here, again, we see an occasional thickness sufficient for all practical purposes. The stone runs very thin in the surface quarries of the Bath area, whilst the absence of beds of less than 3 ft. in thickness is conspicuous in the Westwood and Limpley Stoke areas. Taking these last two facts together it would seem that where the Bath stone has a tendency to run in thick beds these are not accompanied by a corresponding series of thin ones; in other words, we do not find really thick beds in the same quarries as the thin ones, or even in the same areas. If now we compare the summary with the map (fig. 1), we observe that the thickest beds are to the south in the areas B, E, C; whilst there is, roughly speaking, a progression in thickness from the area A to the north-east, through the areas F and H. It is remarkable that on a broad scale there is an apparent connexion between structure and thickness of beds of Bath stone, and we regret that we cannot enlarge on this at the moment. A general impression exists in the district that the thickness of beds increases with depth of working, but although we are prepared to concede that this is the case with some other districts, it does not appear to hold good for the area under consideration, as will be seen on reference to our figures. Of course, if we consider the open quarries only, there is the normal passage from soil, through rubble stone and odd and thin-coursed material, down into the more solid building stone beds; whilst these latter on cropping out at the surface are much more broken up than when found beneath a thickness of overburden.

Method of Quarrying.

Dealing first with the method of quarrying in the open works, the following diagram

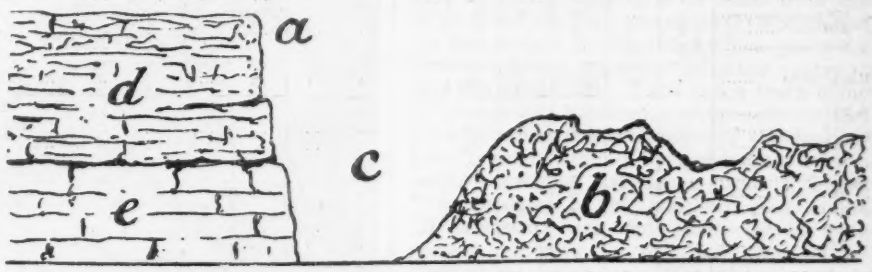


FIG. 11.—*Section of Quarry on Coombe Down* (*No.* 6), *showing method of working.*

a=Present face of quarry. *b*=Rubbish heaps derived from waste of former workings, and thrown behind as the face was quarried into. *c*=Space left between *a* and *b* to admit the passage of vehicles for carting away the stone as quarried. *d*=Overburden. *e*=Building stone to be quarried.

(fig. 11), suffices to indicate the general plan adopted. As the overburden is removed, it is thrown behind the workers, at a sufficient distance from the face of stone to permit of the easy passage of horses and carts for carrying away the blocks as quarried.

In regard to the actual "getting," it may be premised that the rubble and hard useless stone constituting overburden are blasted with rock powder; the building stone is never raised in this way, inasmuch as apart from the waste attending the shaping of blocks due to the irregularity of the cracks produced, blasting has a tendency to "shatter" the stone, creating minute hair-line cracks. At the same time, a "tight place" in the open is occasionally relieved by "shot-hole" blasting. The ordinary method of quarrying the building stone beds is illustrated in the following reproduction from a photograph (fig. 12). We notice that after the removal of the closely-bedded stone and rubble forming the overburden, advantage has been taken of a wide joint in getting out the building blocks. The material is sawn *in situ* by means of a one-handled saw, down to the bedding-plane on which the man is standing. After this cut, another is made in the same manner at right-angles thereto, and the block is then lifted from its bed with the aid of iron bars. Subsequently, any rough surfaces on the stone are shaped by means of a two-edged stone axe, such as is seen in the illustration (fig. 12) resting on the unquarried mass of stone to the right of the sawyer. It may be remarked that but few building stones are capable of being

TABLE No. 1.—*Thickness of Bath Stone Beds.*

Quarry, or Point.	ft. in. Below 1 0	ft. in. 1 0 to 1 6	ft. in. 1 6 to 2 0	ft. in. 2 0 to 2 6	ft. in. 2 6 to 3 0	ft. in. 3 0 to 3 6	ft. in. 3 6 to 4 0	ft. in. 4 0 to 4 6	ft. in. 4 6 to 5 0	ft. in. 5 0 to 5 6	ft. in. 5 6 to 6 0	ft. in. 6 0 to 6 6	ft. in. 6 6 to 7 0	ft. in. 7 0 to 8 0
No. 1	6	1	...	...	1	...	...	...	...	...	...	...	...	...
,, 3	6	1	1	...	...	...	...	...	...	...	...	...	...	...
,, 4	2	...	3	2	2	1	1	...	...	...	...	...	...	...
,, 6	1	1	...	2	2	...	...	1	...	...	...	...	...	...
,, 7	3	4	4	...	...	...	...	...	...	...	...	...	...	...
,, 8	8	...	1	...	...	...	...	...	...	...	...	...	...	...
,, 9	...	3	...	1	1	...	...	...	...	...	...	...	...	...
,, 10	3	...	...	1	...	...	1	1	...	...	...	...	...	...
,, 11	...	...	...	1	1	1	...	1	...	...	...	...	...	...
Bath area	29	10	9	7	7	2	2	3	...	...	...	...	...	...
No. 12	...	...	...	...	...	...	...	...	...	...	1	...	...	...
,, 13	...	...	...	...	...	...	...	...	...	...	...	1	...	...
,, 14	...	...	...	...	...	...	...	...	...	...	...	...	...	1
,, 15	...	...	...	...	...	...	...	...	...	...	...	...	...	1
,, 16	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Limpley Stoke area	...	...	...	...	...	...	...	...	...	...	1	1	...	3
No. 17	...	...	1	...	1	...	...	...	...	...	...	...	...	...
,, 18	...	...	1	...	...	1	...	...	...	...	...	...	...	...
,, 19	...	...	1	...	...	1	...	...	...	...	...	...	...	...
Winsley area	...	...	3	...	1	2	...	...	...	...	...	...	...	...
No. 23	...	...	...	...	...	...	...	...	...	...	...	...	...	1
,, 24a	...	...	...	...	...	...	...	...	...	...	...	...	1	...
,, 24b	...	...	...	...	...	1	...	...	1	...	...	...	...	...
,, 24c	...	...	...	...	...	1	...	...	...	...	1	...	...	...
Westwood area	...	...	...	...	...	2	...	...	1	...	1	...	1	1
No. 25	...	3	5	1	2	...	1	...	...	...	...	...	...	...
,, 26a	2	1	2	1	2	...	...	...	...	...	...	...	...	...
,, 26b	...	3	2	2	1	...	...	1	...	...	...	...	...	...
,, 27a	4	2	2	2	...	...	...	...	...	...	...	...	...	...
,, 27b	...	2	...	1	1	2	1	...	...	...	...	...	...	...
,, 27c	...	1	2	1	4	...	...	...	1	...	...	...	...	...
,, 27d	1	1	2	...	1	1	1	...	...	...	...	...	...	...
,, 27e	...	...	2	1	...	...	1	...	2	...	...	...	...	...
,, 28a	3	3	5	...	...	...	...	...	...	...	...	...	...	...
,, 28b	3	3	4	...	...	...	...	...	...	...	...	...	...	...
Farleigh area	13	19	26	9	11	3	4	1	3	...	...	...	...	...
No. 29	...	...	...	1	...	...	2	...	...	...	...	...	...	...
,, 30a	...	1	2	1	2	1	...	...	...	...	...	...	...	...
,, 30b	...	...	...	1	3	1	1	...	...	...	...	...	...	...
,, 30c	...	...	...	...	...	2	2	...	1	...	...	...	...	...
,, 30d	...	...	1	1	1	...	1	...	...	1	...	...	...	...
,, 31	...	...	2	...	...	1	1	...	1	...	...	...	...	...
,, 32	...	...	1	2	1	...	1	...	...	...	...	...	...	...
,, 33a	...	1	...	...	1	...	1	...	...	...	...	...	...	...
,, 33b	...	...	...	...	...	...	1	1	...	...	...	...	...	...
Box area	...	2	6	6	8	5	10	1	2	1	...	...	...	...
No. 35	...	2	2	4	1	...	1	...	...	...	...	...	...	...
,, 37a	...	...	2	2	...	3	...	1	...	...	...	...	...	...
,, 37b	...	...	2	...	...	...	1	...	...	...	...	...	...	...
,, 38a	...	1	1	1	...	1	...	...	...	...	...	...	...	...
,, 38b	1	1	1	...	1	...	...	...	...	...	...	...	...	...
,, 39a	...	1	3	1	2	...	1	...	...	...	...	...	...	...
,, 39b	...	...	3	2	1	...	...	...	...	...	...	...	...	...
,, 39c	...	3	4	1	...	...	...	...	...	...	...	...	...	...
,, 39d	2	3	5	...	...	...	...	...	...	...	...	...	...	...
,, 40a	...	1	3	1	...	1	...	...	...	...	...	...	...	...
,, 40b	1	...	4	1	...	...	...	...	...	...	...	...	...	...
,, 41	...	2	3	1	1	...	...	...	...	...	...	...	...	...
,, 42	1	...	3	...	1	...	1	...	...	...	...	...	...	...
Corsham area	5	14	36	14	7	5	4	1	...	...	...	...	...	...
No. 43a	...	2	2	...	1	1	1	...	...	...	...	...	...	...
,, 43b	...	2	1	2	1	2	...	...	...	...	...	...	...	...
,, 43c	1	...	1	3	3	...	...	...	...	...	...	...	...	...
,, 44a	...	2	2	1	...	1	1	...	...	...	...	...	...	...
,, 44b	1	...	1	1	1	...	2	...	...	...	...	...	...	...
,, 44c	1	1	3	...	2	...	1	...	...	...	...	...	...	...
,, 45a	1	1	5	...	3	...	...	...	...	...	...	...	...	...
,, 45b	2	1	4	...	1	1	...	...	...	...	...	...	...	...
,, 45c	1	1	4	1	1	...	...	...	...	...	...	...	...	...
,, 46	...	3	2	2	...	...	...	...	...	...	...	...	...	...
,, 47a	...	1	5	1	1	...	...	...	...	...	...	...	...	...
,, 47b	...	1	1	1	1	2	1	...	...	...	...	...	...	...
,, 47c	...	2	1	3	...	1	1	...	...	...	...	...	...	...
Monk's Park area	7	17	32	15	15	8	7	...	...	...	...	...	...	...

Summary.

Areas.														
Bath	29	10	9	7	7	2	2	3	...	...	...	...	...	...
Limpley Stoke	...	...	...	...	...	...	...	...	...	...	1	1	...	3
Winsley	...	...	3	...	1	2	...	...	...	...	...	...	...	...
Westwood	...	...	...	...	...	2	...	...	1	...	1	...	1	1
Farleigh	13	19	26	9	11	3	4	1	3	...	...	...	...	...
Box	...	2	6	6	8	5	10	1	2	1	...	...	...	...
Corsham	5	14	36	14	7	5	4	1	...	...	...	...	...	...
Monk's Park	7	17	32	15	15	8	7	...	...	...	...	...	...	...
Totals	54	62	112	51	49	27	27	6	6	1	2	1	1	4

quarried in such an easy manner as this, whereby at least two even surfaces are produced on the block, so that work and waste are reduced to a minimum. An obsolete method of "getting" the stone is well exemplified in the old workings at Murhill (Quarry No. 17), near Winsley, and elsewhere in the district, where, before the introduction of the one-handled saw, picks were employed; the marks of these latter, producing a peculiar effect, are quite clear to the present day.

Turning now to the method of quarrying Bath stone underground, which is a very different affair, we may first allude to the opening up of the mine. The stone mines in the district have been opened on three different plans, (1) horizontally, running into the side of a hill; (2) tunnels constructed at a high inclination; and (3) vertical shafts. Those of the first-mentioned type—tunnels driven into a hill by following up and excavating in the building-stone bed, are limited in numbers, and may be sufficiently understood without further description. The second type is that most commonly adopted in the district under consideration, and refers to nearly all the mines in areas B, F, and I, the majority in G, and H, and to one each in A, and E*; in short, to nearly all the principal quarries. It will be easily understood, on reference to figs. 13 and 14, as also will the means of drawing stone out of the mine. The third type—obtaining the stone by means of a vertical shaft—requires no explanation; Quarry No. 35 furnishes the best example of it in the district. The haulage above ground is by steam-power or by horses and winch.

As will have been surmised from the legend attached to fig. 14†, the stone is transferred from the various headings to the bottom of the inclined shaft in trucks running on tram-rails. In the majority of the workings the haulage underground is effected by means of horses, but in the case of the Clift Quarry (No. 30), in the Box area, and some other workings connected therewith, the stone is drawn out on the flat by means of a steam-engine. That from Corsham Down Quarry (No. 37) is placed in railway trucks underground, communicating directly with the Great Western Railway system. In a few of the smaller quarries, or where no tram lines are laid down, the stone is drawn out on the flat in wagons, by horse-teams.

In regard to the actual method of "getting" underground, we would direct attention to fig. 15. The first operation in driving the heading is to remove two or three inches of the stone immediately under the roof, by means of picks; the part thus to be removed is called the "jad," or "picking jad" (*b*). By creating this space the quarrymen are enabled to insert tools to loosen the blocks below, but in order to do this more effectually a thin bed (*c*), known as the "picking bed," is also taken out, both this and the jad being reached from a ledge called the "picking standing" (*d*), whereon the picker stands. Plenty of room having now been obtained, the one-handled saw is called into requisition, and with this, and subsequently iron bars, the blocks are removed. A hand-crane is used at every heading to assist in the work. Under certain circumstances a "lewis" is inserted into the face of the block, and this being attached to the crane, either directly or indirectly, is utilised for dislodging the blocks from position. At point *b* in the Clift quarry (No. 30) the "jad" was being picked from scaffolding. In sawing underground, water is always used, not so much that it makes the stone softer along the line of cutting, but because it washes out the dirt made during the operation, and thus frees the cut of obstruction. The roofs of the workings vary considerably, some being very sound, others permeated by innumerable cracks. The general method of keeping up the roofs in driving ahead is to leave pillars of the stone at intervals. Where the roof is good these are left far apart from each other, when bad they are arranged closer together, or the bad places may be strutted-up by timbering. The term "breach" is applied to the width from pillar to pillar; and a "wrist" is the taper-shaped (smaller at back than front) stone first pulled out from under the jad in working ahead.

The locality in the Box Ground group, known as the "Cathedral," is interesting, as showing the method of obtaining stone from mines years ago. Here a vertical shaft was sunk, which on reaching the building stone levels widened out in the form of a gigantic bell, or a dome with a hole in its roof, up which the stone was lifted by chain and horse-gearing. The walls are scored by pick-marks, as in the open working at Murhill.

The disposition of the strata, known as "wedge-bedding," is a great nuisance to quarrymen, creating, as it does, sloping beds and, near the roof, tapering blocks leading to much waste. Faults, naturally, are not

* See map in last issue.
† Figs. 14 to 17 are on page 295.

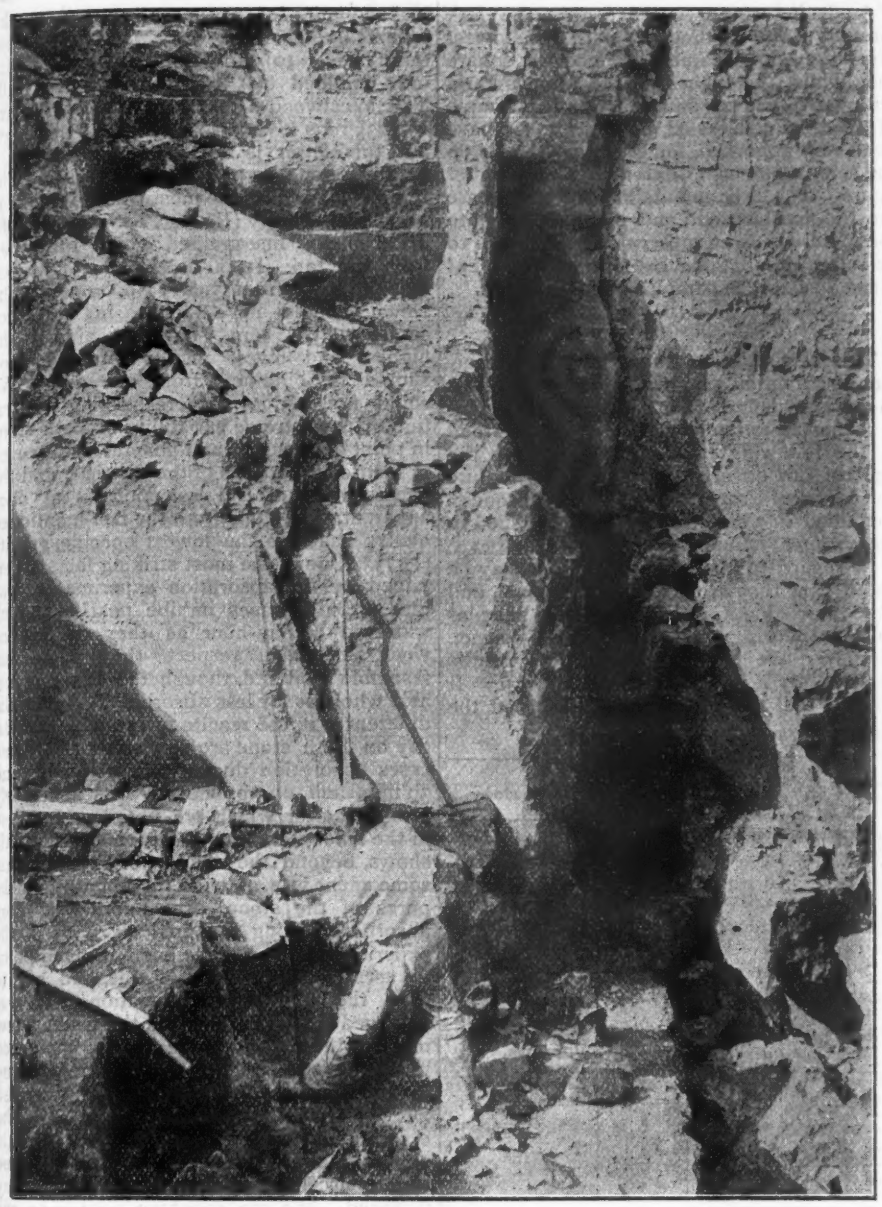


FIG. 12.—*"Getting" Bath Stone, at Mount Pleasant Quarry, Coombe Down.*

regarded with much favour, seeing that they disturb the general regularity of the beds, and often lead to a considerable amount of unremunerative work. Fig. 16 shows how step-faults are dealt with.

Quarrying is also occasionally impeded by wide joints containing ferruginous clay ("barrs") which discolours stone in the vicinity, and in former geological times allowed the free percolation of water, with consequent regional decomposition.

Seasoning.

We have very little to say in regard to this. At many quarries the stone was either being converted on the spot immediately after it was extracted, or was being despatched to various "jobs." In such cases seasoning was, of course, not possible. In saying this we convey no imputation against the quarry owners, inasmuch as many architects and builders prefer not to have the stone seasoned. That process hardens the material, and in consequence increases the cost of labour, and there being a demand for the unseasoned stone, it is, naturally, supplied. At the same time, we could not help feeling that amongst certain of the smaller quarry-owners no serious attempt was being made to "weather" or season the stone, even where it might have been desired. The case was different with larger firms, at whose quarries immense stacks of stone were often found. When stacked above ground to "weather" in winter time much of the material is liable to deteriorate, so that the stone quarried in mines during that season of the year is either stored in the spacious galleries underground, or sent off at once to the building. Having said this, we leave our readers to imagine what may happen to some of it when drawn from the quarry during winter and used at once for exteriors. The material stored underground is taken above during the early spring, is then stacked, and being exposed to the air is allowed to season in summer-time, after which it is not so liable to decay. A great deal has been made in the past of the improvement effected in "weathering" such stones as that from Bath before using them. We do not desire to make any further comment than to remind those who attach such great importance to this, that no amount of seasoning can render a really bad block of stone good. From the manner in which some people allude to the beneficial effects of seasoning one would be led to imagine that any rotten, worthless kind of stone is converted into a good one by being simply placed out in the wind for a season. The stone must be good in the first instance, and it will then most probably be improved by being allowed to "weather," but that depends entirely on the particular kind of stone. We cannot now discuss the desirability, or otherwise, of always building Bath stone "on its natural bed," but we may remark in this connexion that in order to facilitate masons in ascertaining the direction of the bedding-planes, much of the material is marked before leaving the quarries.

Carriage of Stone.

Bath stone is taken from the quarries either by horse-teams, traction-engines, railway direct, or a system of inclined planes. We may only refer to the last-mentioned, which is adopted principally in area I, and in the western part of G. The following diagram (fig. 17) shows that between the Park Lane Quarry and Corsham Station a low ridge intervenes. Instead, therefore, of starting the loaded trucks down an incline direct to the station, as is done from the Clift Quarry to Box, an engine (*b*) is stationed at the summit of the ridge which pulls the trucks (*a*) from the entrance of the quarry to the top of the hill. Then (each truck being in charge of a breaksman) they are permitted to accomplish the remainder of the journey to Corsham Station by gravitation, with a little occasional assistance from a horse. The quarries in the southern part of the Bath district are fed partly by a canal, whilst railways, as will be seen on referring to fig. 1, run through the whole system.

Micro-Structure.

This has been fully described and illustrated in our columns on a former occasion,* and the reader is requested to consider what we then said with reference to what follows.

Chemical Composition.

We have not thought it worth while to make independent chemical analyses of Bath stone, seeing that its properties in this respect are not important as throwing any light on the quality of the material, and may be sufficiently gleaned from what we have already said concerning its micro-structure. At the same time, as a matter

* The *Builder*, January—June, 1894, pp. 354, 372.

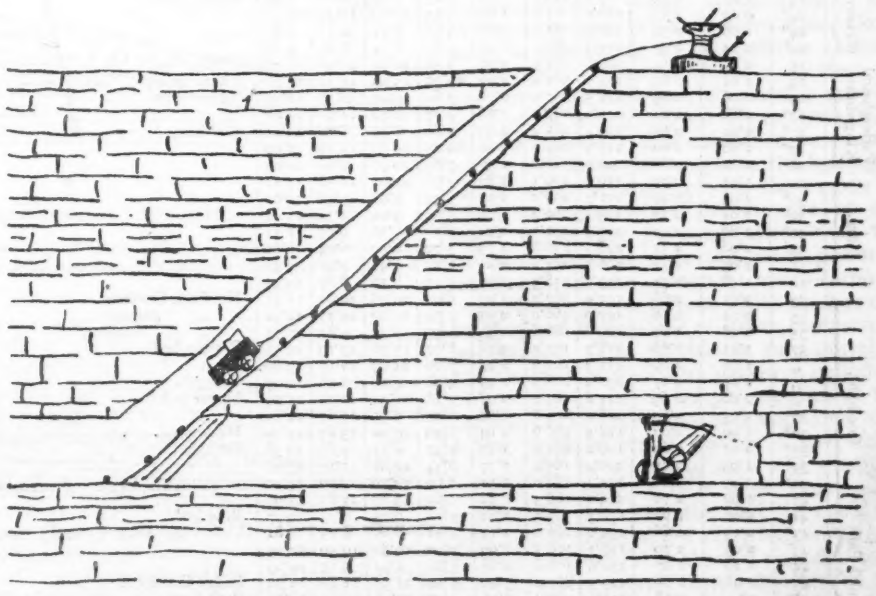


FIG. 13.—*Section showing Inclined Shaft and method of hauling stone from a mine.*

of general interest, we may quote the following :—

	Coombe Down stone.*	
	I.	II.
Water	·88	·74
Silica	·42	·85
Protoxide of iron	1·22	1·04
Alumina	·46	·61
Carbonate of lime	95·14	95·74
Carbonate of soda	·71	·71
Magnesia	·32	·23
Chloride of sodium	·05	·05
	99·20	99·97

	Monk's Park stone.†	Box Ground stone.‡
Carbonate of lime	97·2	94·52
Oxide of iron and alumina	1·6	1·20
Silica	1·0	—
Carbonate of magnesia	·2	2·50
Water and loss	—	1·78
Bitumen	—	trace

* Ransome and Cooper, "Mem. Geol. Surv. Gt. Brit.," Vol. ii., Pt. 2 (1848), p. 691.
† Analyses made by Professor Attfield.
‡ Daniell and Wheatstone, "Commissioners' Report" (1839), p. 30.

Strength.

We give the following particulars (Table No. 2) concerning the strength of the different varieties of Bath stone, in order that their general resistance to crushing may be understood.—

Analysing these, we find that the Box Ground stone is credited with the lowest crushing weight, namely, 54 tons per square foot, whilst the highest is the Monk's Park, with 210·9 tons per square foot. The sample of Box Ground tested, however, must have been very abnormal, for the other results on the same stone come out at a much higher figure. The experiments of Professor Beare are the most recent, and probably apply to the materials as at present quarried; it is to be regretted that the experimenter did not himself select the samples in the quarries.

Other Physical Properties.

This section is, perhaps, the most important contribution we have to offer in regard to our knowledge of Bath stone. The reader is requested to interpret the results recorded in the following table (Table No. 3) in the light of our observations "On the Structure and Physical Properties of Building Stones," contained in a series of articles published in the *Builder*, January—June, last year.

In regard to these experiments it may be noted that they are, every one, original, and were carried out by ourselves on samples collected during our visit to the district. Moreover, we have recorded the results afforded by every sample dealt with. It appears that the stone which absorbed the least amount of water during one week's immersion is from the Mount Pleasant quarry (No. 10), on Coombe Down, which only imbibed 6·35 per cent. of its bulk. The Westwood Ground paving bed (quarry No. 23), runs it very close with 6·45 per cent., but this latter is not, strictly speaking, a building stone, as previously remarked. The sample absorbing the most water was from Longsplatt quarry (No. 25), Kingsdown—the uppermost "fine-grained" bed, third bed from the top. It is noteworthy, however, that the stone from Quarry No. 8 on Coombe Down should have taken in as much as 16·37 per cent., so that almost the highest and lowest results on absorption should be obtained from one area. We could not adduce a more striking illustration of the extreme variability of Bath stone in point of openness and general quality even in restricted portions of the district; and the necessity of careful selection is at once apparent. The stone from the last-mentioned quarry has also the lowest specific gravity (1·77). One of the most striking facts ascertained by the absorption experiments was that all Bath stones imbibe nearly as much water in half-an-hour as they do in one week, in which respect they somewhat resemble Portland, though the latter stone, as a whole, is far less absorbent. Again, the differences in the results for 30 min. and the day on Bath stone are very slight; in some cases absorption during immersion beyond 30 min. and up to one day was absolutely arrested, after which we notice an increase in the amount at the end of a week. This shows, beyond the shadow of a doubt, that some agent was at work in opening up the pores of the stone, or rendering it more absorbent, during the final six days of the experiments. We have been at much pains to ascertain the cause of this, and beg to offer the following explanation. It was observed that after being in the water a few minutes, the majority of the stones commenced to disintegrate slightly; but there was no material increase in the amount disintegrated after that, for some 3 or 4 days. On the expiration of that period, however, it would appear that the rate of wasting became slightly accelerated, but after the sixth day it ceased. We are speaking now as to the general effects produced: certain samples were not subject to this peculiarity, and constitute remarkable exceptions to the general rule. Some of the salts in the stone are soluble in water, and it may be that these had, as far as possible, to be removed before maximum absorption could be arrived at. It is probable that in some instances progressive absorption may account for the phenomenon, but this cannot apply to many samples. The rate of absorption was, in other respects, very peculiar, and it will be seen on a casual inspection of the table that the results obtained on the first dip (1 second) are by no means indicative of what will take place during a week—except, of course, in a general way. To this there are a few notable exceptions. On studying the table, several other points may be brought out, but we think the results, to a large extent, explain themselves.

TABLE NO. 2.—*Strength of Bath Stone.*

Name of Stone.	Size of Cube.	Cracked. Tons per sq. foot.	Crushed. Tons per sq. foot.	Test made by
	in.	Minimum. Maximum.	Minimum. Maximum.	
Corsham Down ("fine upper" bed)	12	64·4	83·7	Kirkaldy.
" " (bottom bed)	12	75·1	102·8	"
" " " "	1½	—	87·4 | 97·7	Poole & Son.
" " " "	3	—	185·1	"
" " " "	3	61·7 | 87·4	74·5 | 87·4	"
" " " "	2¼	—	70·1 | 128·6	Beare.
Corngrit	12	84·1	116·3	Kirkaldy.
"	2¼	—	107·3 | 172·4	Beare.
Box Ground	1½	—	76·3	Poole & Son.
" "	1½	66 0	73·7	"
" "	3	—	133·7	"
" "	3	43·7 | 48·8	54·0 | 54·0	"
" "	2	—	95·0	Roy. Com.
" "	2¼	—	81·9 | 126·1	Beare.
Monk's Park	6	150·8 | 193·6	172·6 | 210·9	Kirkaldy.
" "	2¼	—	112·8 | 172·0	Beare.
Farleigh Down	2¼	—	58·1 | 69·3	"
Coombe Down	2¼	—	93·3 | 151·2	"
Stoke Ground	2¼	—	70·4 | 106·7	"
Winsley Ground	2¼	—	85·2 | 114·9	"
Westwood Ground	2¼	—	89·7 | 140·4	"

TABLE NO. 3.—*Experiments on some Physical Properties of Bath Stone.*

Name of Area.		No. of qu'ry, or point.	Specific Gravity. True.	Specific Gravity. Particles	Weight per cubic foot in lbs. Dry.	Weight per cubic foot in lbs. Wet.	Absorption of Water—per cent. 1 sec.	1 min.	30 min	1 day.	1 week	Remarks.
Limpley Stoke	Bath.	1	2·04	2·54	127·3	158·5	1·45	4·13	8·27	8·75	9·48	Odd Down.
		6	1·92	2·55	119·8	159·1	2·33	6·43	10·52	11·11	12·86	Coombe Down.
		7	2·10	2·61	131·0	162·9	1·69	4·36	7·76	8·25	9·22	"
		8	1·77	2.49	110·4	155·4	2·63	7·00	12·57	13·15	16·37	"
		10	2·10	2·43	131·0	151·6	·73	2·44	5·62	5·86	6·35	"
		11	1·90	2·40	118·5	149·8	2·00	5·00	8·50	9·00	11·00	Third bed from top.
		12	1·95	2·58	121·7	161·0	2·31	6·18	10·30	11·08	12·37	
		13	1·89	2·57	117·9	160·4	3·06	8·16	12·24	12·75	14·03	
		14	2·10	2·60	131·0	162·2	1·35	4·05	8·37	8·64	9·18	
		15	1·96	2·65	122·3	165·4	2·58	7·29	11·52	12·00	13·17	
Winsley		18	2·04	2·57	127·3	160·4	1·62	4·17	9·28	9·74	10·20	
Farleigh and Kingsdown.	Westwood	23	2·09	2·64	130·4	164·7	1·49	4·47	8·70	9·20	9·95	
		23	2·07	2·39	129·2	149·1	·86	2·15	5·59	6·02	6·45	Paving Bed.
		24a	2·02	2·63	126·0	164·1	1·96	5·55	10·13	10·45	11·43	
		24b	2·06	2·59	128·5	161·6	1·86	4·90	8·41	9·11	9·80	
		24c	2·04	2·57	127·3	160·4	1·61	4·31	8·34	8·89	9·97	
		25	2·00	2·61	124·8	162·9	1·76	5·58	10·29	10·58	11·76	"Oaty" bed.
		25	1·84	2·65	114·8	165·4	4·33	13·66	15·33	15·33	16·66	"Fine grained" bed.
		25	2·06	2·69	128·5	167·9	2·26	7·80	10·07	10·57	11·33	"Fine" bed.
		27a	1·88	2·61	117·3	162·9	2·65	8·77	11·70	11·96	14·62	
		27c	2·09	2·65	130·4	165·4	2·35	7·06	8·44	8·70	10·11	Red bed.
		27e	1·88	2·62	117·3	163·5	3·21	10·45	12·86	13·13	15·00	
		28a	2·02	2·67	126·0	166·6	2·56	7·69	10·76	11·02	12·05	
		29	1·91	2·55	119·2	159·1	2·82	7·96	11·05	11·56	13·11	
	Box.	30a	1·95	2·47	121·7	154·1	2·07	5·44	9·06	9·58	10·62	
		30b	2·01	2·57	125·4	160·4	1·75	5·52	9·04	9·54	11·04	
		30c	1·89	2·42	117·9	151·0	2·14	6·16	9·38	9·65	11·52	
		30d	2·06	2·51	128·5	156·6	1·73	3·72	6·70	6·94	8·68	
		31	2·03	2·52	126·7	157·2	2·41	5·55	7·48	7·97	9·42	
		32	1·98	2·54	123·5	158·5	2·07	4·43	8·58	8·87	10·94	
	Corsham.	35	2·05	2·68	127·9	167·2	1·93	6·03	10·38	10·62	11·35	Hartham Corsham.
		35	2·04	2·66	127·3	166·0	2·25	7·51	10·27	10·77	11·52	" ground.
		35	2·08	2·67	129·8	166·6	1·55	5·95	9·32	9·84	10·62	" "Scallett."
		37a	1·95	2·68	121·7	167·2	3·16	8·97	12·92	13·19	13·98	Bottom bed.
		"	1·96	2·69	122·3	167·9	2·45	7·66	11·93	12·57	13·80	"
		"	2·09	2·67	130·4	166·6	1·47	4·66	9·09	9·58	10·29	Corngrit.
		"	2·00	2·63	124·8	164·1	2·38	7·16	10·14	10·74	11·94	Upper bed.
		37b	2·03	2·67	126·7	166·6	1·94	6·55	9·95	10·67	11·89	"
		38b	1·90	2·67	118·5	166·6	2·84	8·26	13·10	13·67	15·10	Huddswell.
		39a	2·07	2·65	129·2	165·4	1·40	4·47	9·17	9·88	10·58	Corngrit.
		39b	1·93	2·65	120·4	165·4	2·37	8·44	11·87	12·13	13·98	
		40b	1·93	2·66	120·4	166·0	1·71	8·60	12·76	13·26	14·00	
		41	1·92	2·70	119·8	168·5	2·81	8·80	13·63	13·63	15·05	
		41	2·06	2·62	128·5	163·5	1·82	5·18	9·75	9·75	10 37	Blue bed.
Monk's Park		43b	2·15	2·66	134·2	166·0	1·14	4·21	8·05	8·05	8 81	
		43c	2·03	2·70	126·7	168·5	2·00	7·00	10·50	10·50	12·25	
		44b	2·10	2·67	131·0	166·6	1·87	5·86	8·92	9·15	10·09	
		46	1·98	2·68	123·5	167·2	3·49	9·94	11·55	11·82	12·90	Ridge Corsham.
		47a	2·02	2·68	126·0	167·2	2·56	7·92	11·18	11·42	12·12	Park Lane.
		47b	1·99	2·67	124·2	166·6	2 82	8·74	11·82	11·82	12·85	"

Conclusion.

In concluding this somewhat lengthy article we may observe that the Bath stone, as now used, is different to most of that worked at the commencement of the century, or even seventy years ago. It was therefore with great reluctance that we brought ourselves to quote the chemical analyses of Coombe Down stone made in 1848, or those by Daniell and Wheatstone in 1839; we admitted them only after satisfying ourselves that the Coombe Down stone referred to must, of necessity, have been exploited very close to the present workings, and also that the Box Ground stone dealt with most probably was obtained from the "Cathedral" (Quarry No. 30), or near by. Bath stone has been raised in enormous quantities on Bathampton Down, and the remains of an inclined plane to the valley below, as at

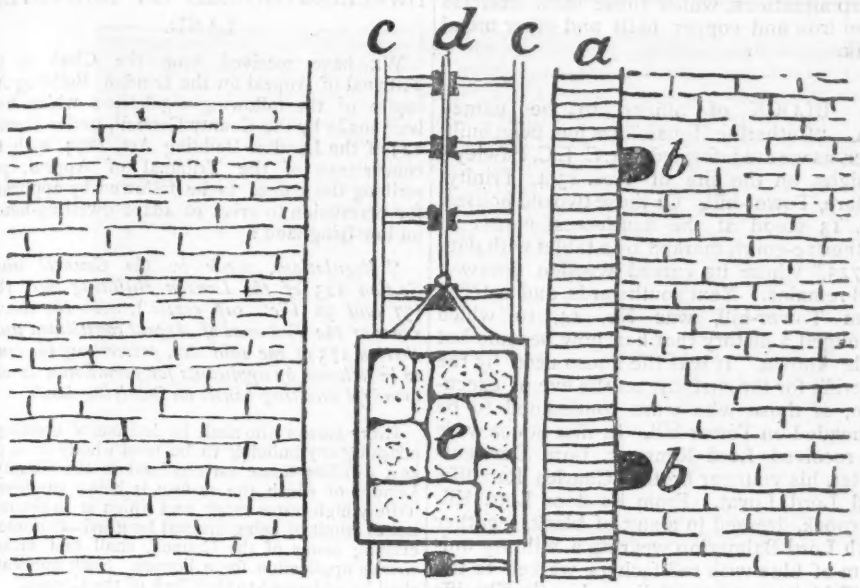


FIG. 14.—*Plan of portion of Inclined Shaft, giving details.*

a=Steps down to the mine. *b*=Manholes. *c*=Tram-rails. *d*=Steel cable, working on rollers, and attached to a truck laden with stone (*e*), which is being hauled up the incline by an engine at the surface.

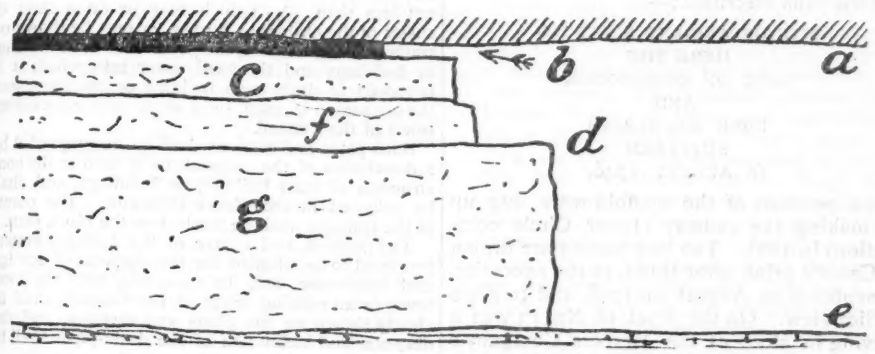


FIG. 15.—*Section of heading underground, showing method of quarrying Bath stone.*

a=Roof of working. *b*=Jad. *c*=Picking bed. *d*=Picking standing. *e*=Bottom of quarry. *f*, *g*=Blocks about to be quarried.

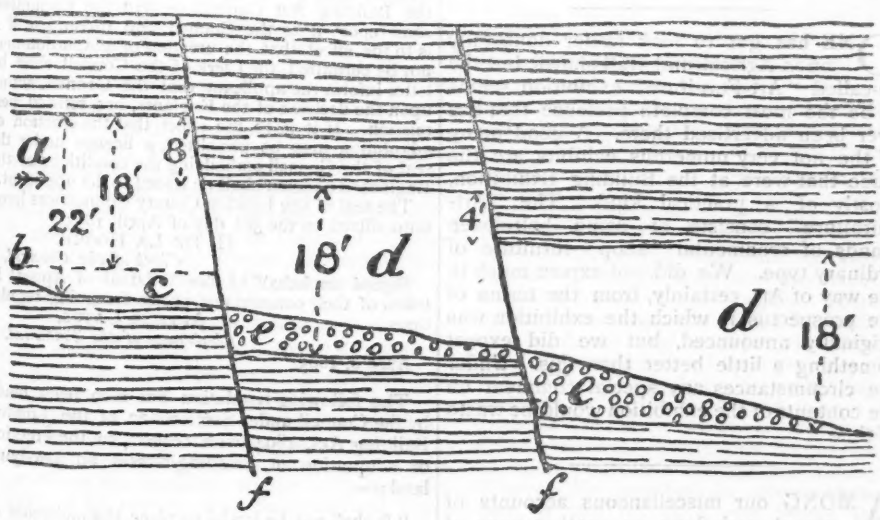


FIG. 16.—*Quarrying underground through step-faults.*

f, *f*=Faults. *a*=Gallery worked in the direction of the arrow, in good stone. *b*=Floor at that time. *c*=Useless stone blasted away, lowering floor to assist in working out faulted stone at *d*, *d*. *e*, *e*=Rubble filled in (after abstraction of stone) to level of floor at *c*.

FIG. 17.—*Method of conveying stone from Park Lane Quarry* (*No.* 47) *to the Corsham railway station.*

a=Trucks being pulled up incline by the stationary engine *b*. *c*=Truck running down inclined plane to railway station yard *d*. *x*=Entrance to quarry.

Murhill, may still be seen. On Coombe Down, also, many large abandoned quarries exist.

NOTES.

MR. PETRIE'S discovery of an ancient non-Egyptian town in Egypt, as described in the *Times* report of his lecture to the Royal Society of Edinburgh, is one of the most sensational discoveries that has ever been made in Egypt. Mr. Petrie first described the discovery of the site of the small but very ancient Egyptian town of Nubt-Ombos, which contained pottery remains of the IVth, XIIth, and XVIIIth and XIXth dynasties, so that its history must have extended over a very long period. But a quarter of a mile from this lay the remains of another town in which not a single relic was like any of those in the Egyptian town; the remains were as remote in style as if they had belonged to Syria or Persia. Various cemeteries were discovered here, and from the nature of the remains found it was deduced that this city belonged to the period between the VIIth and IXth dynasties, or about 3000 B.C. Mr. Petrie argues that these were probably the people who overthrew the Egyptian civilisation and produced the "dark age" of Egyptian history of the VIIth and VIIIth dynasties. This is a new point of departure in Egyptian archæology, and will doubtless lead to a search for other remains of the same (apparently) invading race.

THE Blue-book containing the report of the Department of Public Works, New South Wales, shows the system of illustrated official reports of this class very fully carried out. Photographs of all the principal engineering works and the two or three architectural works mentioned in the Report are appended, together with a number of plans and geometrical drawings of construction. This kind of illustration adds greatly to the value and interest of a Works Department report. Among the undertakings illustrated are the Bay Harbour Works, the Garden Island Naval Station and Stores, the New Town Post and Telegraph Office, the Sydney Hospital, of which complete plans are given as well as a photographic view, the New Lands Offices, Sydney (a rather good building except for the design of the square cupola), various bridges, the wrought-iron aqueduct at Walli Creek, the aqueduct at Rocky Point Road, and various others. The New South Wales Works Department may be congratulated on having produced a very interesting volume.

THE most interesting recent discovery in experimental chemistry is the method of making calcium carbide on a commercial scale. The discovery, like many others in chemistry, was made accidentally. Mr. Willson, of the Willson Aluminium Company, in attempting to get metallic calcium in his electric furnace from a mixture of dry lime and coal-dust, obtained a greyish solid mass, which proved on analysis to be calcium carbide. This substance in contact with water develops acetylene, the hydrogen of the water combining with the carbon to form this gas, while the oxygen of the water forms lime by combination with the calcium. Acetylene is the most powerful illuminant of the gaseous hydro-carbons, hence the compound from which the gas can be obtained so easily is of great commercial importance. The carbide is very portable, and could be supplied to houses in cylinders or in sticks for use in lamps. A stick of the carbide held in the hand and sprinkled with a few drops of water evolves a gas which can be lit by a match, and will continue burning as long as it is kept moist. For commercial purposes, the carbide could be supplied in sticks about 12 in. long and 1½ in. in diameter, weighing about a pound. Such a stick will generate five cubic feet of the gas. Professor Vivian Lewes, in his lecture

on the commercial importance of calcium carbide to the Society of Arts, calculated that if it could be procured for 4*l.* a ton, then, as a lighting agent, it would be equivalent to London coal-gas at 6d. per thousand. At this price it would, of course, prove a most formidable rival to coal-gas and electric lighting. In a country house, for example, it would be only necessary to have a closed vessel charged with the carbide and provided with an automatic stop-cock to supply it with water. This receiver connected to the piping of the house through a small gas-holder to regulate the pressure, would form a most efficient lighting arrangement. Luckily, too, as Professor Lewes pointed out, acetylene has a most pungent smell, so the smallest leakage would be easily detected, and there would be practically no danger from poisoning. The only point about which the opinion of experts still differs is the price the carbide would cost to make. A writer in the *Journal of the Franklin Institute*, taking electric power to cost 6*l.* 5s. per horse-power per annum—it can be got for 4*l.* 10s. at Niagara—calculates the price to be 8*l.* 6s. per ton; and, assuming its illuminating power to be ten times that of ordinary gas, this would be the same as gas at 1s. ½d. per thousand. This is the bare cost of making; the final cost, as delivered to consumers would be higher. From the Gas Light and Coke Company's accounts we find that the net cost of manufacture at the works is generally about a shilling per thousand cubic feet of gas ultimately sold. So that, on this estimate, the new lighting agent seems to be dearer than the old one. Still, even at this price, which, by the way, is more than double the estimate of Dr. Henry Morton, of Stevens' Institute, it will be very valuable for enriching coal-gas, and to electrical engineers the manufacture of the carbide opens a wide field for improving the load factor of their central stations. That they are not slow to recognise the possibilities of the new product, the "Carbid" company which has been started in Berlin shows. In this company the well-known electrical firms of Siemens & Halske, and the "Allgemeine Elektricitäts Gesellschaft" are interested.

A PAMPHLET on Mr. Stanley Churton's "Hydrargyrum-cum-Zinco Process" for preserving timber has been issued by Sir W. Burnett & Co., of Millwall. Its object is to recommend the combination of two well-known methods of preserving timber, viz., "Burnettising," which involves the use of chloride of zinc, and "Kyanising," which utilises the well-known antiseptic and germicide corrosive sublimate or mercuric chloride. There is no apparent reason why the two processes should not be combined, but as no comparative experiments are quoted we have no data upon which to base an opinion as to the superiority, or otherwise, of the combination over the parent methods. The whole tenor of the pamphlet is, indeed, to the effect that the combined process should be, might be, ought to be, advantageous. What practical men want to know is whether it has been proved to be superior to other processes, and if so, when, where, for how long, and at what cost. In the *Builder* of August 21 and 28, 1886, the subject of the preservation of wood was very fully gone into, and it was there pointed out that deal planks which had been "Kyanised" and employed in a damp, unfavourable situation remained sound for some seven years, while similar planks which had been creosoted were found to be perfectly sound after the expiration of twelve years' exposure. According to Boulton, all processes which involve the use of salts of metals have invariably failed when exposed to the prolonged action of sea-water. Another serious defect which has to be faced when the chlorides of zinc and mercury and similar salts are employed as timber preservatives, is the rapidly corrosive action, especially in damp situations, which these salts exercise upon iron and copper nails and other metal work.

A BLOCK of offices, to be named "Catherine House," has just been built, after, as we are informed, Mr. C. J. C. Pawley's designs, on the site of Nos. 13-4, Trinity-square, Tower-hill. Of those two old houses, No. 13 stood at the south-west corner of Catherine-court, marked by a tablet with date "1725," where its carved wooden doorway still remains. Next southwards, and entered from Tower-hill, was No. 14, to which belonged a history that has now become but little known. It was the house used by the Sheriffs for the custody, on the eve of execution, of those who were condemned to be beheaded on Tower-hill. In that house were so received Lord Kenmuir, Lord Derwentwater, his younger brother Charles Ratcliffe, and Lord Lovat. From its door Lord Kilmarnock, dressed in a suit of black, together with Lord Balmerino wearing a military uniform of blue with red facings, walked to the scaffold, having been delivered to the Sheriffs on the evening before from Wakefield Tower, in the Tower. The situation of the scaffold, directly opposite Catherine-court, is marked in Trinity-square Garden by a square of pink and grey granite blocks in which is set a stone thus inscribed:—

SITE OF ANCIENT SCAFFOLD
HERE THE
EARL OF KILMARNOCK
AND
LORD BALMERINO
SUFFERED
18 AUGUST 1746.

Some portions of the scaffold were dug up in making the railway (Inner Circle completion) in 1883. The two houses are drawn in Canot's print, after Budd, of the execution of sentence on August 18, 1746, and in Kip's earlier view. On the front of No. 13 was a carving in stone of the Mercers' Company's arms — a demi-virgin, crowned, her hair dishevelled, issuing out of clouds; a similar stone, much older in date, was on the front of No. 14, and has been re-fixed in the front of Catherine House.

ONE has got to look rather doubtfully upon Agricultural Hall shows, but the so-called "Art-Furniture" exhibition seems to be the most complete pretence that has ever been advertised there. A good many of the not very numerous exhibits are the same that were at the Building Exhibition, mostly of a practical kind. The "Art-Furniture" consists of some half-dozen stands of ornamental "shop" furniture of ordinary type. We did not expect much in the way of Art, certainly, from the terms of the prospectus in which the exhibition was originally announced, but we did expect something a little better than this. Under the circumstances any special comment on the contents of the exhibition would be waste of time.

AMONG our miscellaneous accounts of recent work done, on another page of this issue, is a description of a new stained glass window put up in a church in Liverpool, in which the figure of Christ is described as "vested in dalmatic and cope." We never of course enter in these pages into any discussion as to points of religious doctrine or ritual. But as a matter of artistic commonsense it is surely time that some protest were made against the absurdity, in a chronological if in no other sense, of representing the figure of Christ as clad in special official vestments invented in the Church centuries after the date of his life on earth. We observe that the window is described as "carried out in the fifteenth century manner." The conception of Christ and of his relation to church history seems to be "in the fifteenth century manner" also.

DWELLING-HOUSES ON LOW-LYING LAND.

WE have received from the Clerk to the Tribunal of Appeal for the London Building Act copies of the following regulations which have been made by the County Council, under Section 123 of the London Building Act, 1894, with the concurrence of the Tribunal of Appeal, prescribing the course to be followed by applicants for permission to erect or adapt dwelling-houses on low-lying land:

"*Regulations made by the Council under Section* 123 *of the London Building Act*, 1894 (57 *and* 58 *Vict., cap. ccxiii.*), *with the concurrence of the Tribunal of Appeal constituted under Section* 175 *of the said Act, prescribing the course to be followed by applicants for permission to erect or adapt dwelling-houses on low-lying land.*

Every person who shall be desirous of erecting or adapting any building to be used wholly or in part as a dwelling-house on any land in the County of London of which the surface is below the level of Trinity high-water mark, and which is so situate as not to admit of being drained by gravitation into an existing sewer of the Council, shall first make a written application for a licence. Such application shall be addressed to the Clerk of the Council.

Such application shall contain a statement as to the nature and extent of the interest of the applicant in the building or buildings proposed to be erected or adapted, and be accompanied by a plan and section of the lowest floor of such building or buildings and the curtilages thereof to a scale of ⅛th of an inch to a foot, and by a block plan to a scale of not less than $\frac{1}{2500}$ (which may be on a sheet or sheets of the Ordnance Survey, or may be drawn on tracing linen), showing the position of such building or buildings and the local sewer into which it is proposed to drain such building or buildings, and the connexion of such local sewer with an existing sewer of the Council.

Such plans and sections shall be accompanied by a description of the materials to be used in the construction of such building or buildings, and shall be coloured in accordance therewith. The points of the compass shall be marked on the block plan.

The position and course of the drainage system proposed to be adopted for the disposal of sewage and rain-water, and its connexion with the local sewer or an existing sewer of the Council, shall be clearly shown on the plans and sections, and the diameter and inclination of the drain-pipes shall be figured thereon.

The plan and section shall also indicate in figures the level above or below Ordnance datum at which it is proposed to construct the floor of the lowest rooms.

The decision given by the Chief Engineer of the Council upon such application shall be reported to the Building Act Committee, and the Committee shall report it to the Council, and thereupon, if it is to the effect that the erection or adaptation may not be permitted, the Clerk of the Council shall by letter inform the applicant that the Council, acting upon the decision of the Engineer, has refused permission. If it is to the effect that the erection or adaptation may be permitted, a licence under the seal of the Council embodying the conditions of the Engineer's decision shall be issued to the applicant.

The seal of the London County Council was hereunto affixed on the 3rd day of April, 1895.

H. DE LA HOOKE,
Clerk of the Council.

Signed on behalf of the Tribunal of Appeal in token of their concurrence in the foregoing regulations.

ARTHUR CATES,
Chairman of the Tribunal.

April 8, 1895."

The following regulation has also been made by the Council under Section 122 of the London Building Act, 1894, with respect to the erection or adaptation of dwelling-houses on low-lying land:—

"It shall not be lawful to place the underside of the lowest floor of any permitted building at such a level as will render it liable to flooding, and every permitted building shall be efficiently and properly drained to the satisfaction of the Engineer for the time being of the Council, either into a local sewer or into a main sewer of the Council.

March 26, 1895."

ARCHITECTURAL ASSOCIATION: DISCUSSION SECTION.—At the tenth meeting of the Session of this section, held at 56, Great Marlborough-street, on the 10th inst., Mr. W. Henry White in the chair, Mr. H. J. Leaning, F.S.I., read a paper entitled "Notes on the Conditions of Building Contracts." The discussion was opened by Mr. Brodie, and sustained by Messrs. Greenop, Scott, Tyars, and Garbutt. A vote of thanks having been unanimously passed to the author of the paper, Mr. Leaning replied, and the meeting terminated.

Embossed Frieze: Designed by Mr. Stephen Webb.

DESIGN FOR AN EMBOSSED FRIEZE.

THIS is an example of a style of frieze of which several have recently been designed by Mr. Stephen Webb. The one illustrated is distinguished as the "Piper Frieze." This class of friezes, which were designed for, and are made by, Messrs. Jeffrey & Co., are supplied either in colour or enriched with gilding, or in plain white for subsequent decoration. They are also made in the form of thin embossed copper plates, a treatment for which the character of the design is very well suited.

COMPETITIONS.

DISTRICT COUNCIL BUILDINGS, NEW HUNSTANTON, NORFOLK.—A limited competition for the District Council Buildings for this place has just been decided, the plans of Messrs. George H. & W. Skipper, architects, of Norwich, being selected. Four other architects (all or London), were invited to submit plans. The amount to be expended is 2,000*l.*

INFECTIOUS DISEASES HOSPITAL, PENZANCE.—The first premiated design in this competition ("Eclipse") is by Mr. Hampden W. Pratt, Rolls Chambers, 89, Chancery-lane, W.C. The second ("Aspect"), being by Mr. F. Hunter Lines, 102, Darlington-street, Wolverhampton; and the third ("Lion Rampant") by Mr. F. E. Pearce Edwards, Liverpool, and Mr. Arnold Thornely, Birkdale. The assessor was Mr. T. W. Aldwinckle.

SCHOOL BUILDINGS, PORTMADOC.—A meeting of the Court of Governors of the Portmadoc Intermediate School was held on the 10th inst., for the purpose of selecting plans for the proposed erection of new buildings at a cost of 2,400*l.* Colonel Ellison, of Liverpool, adjudged the plans of Mr. A. Teather, of Cardiff, to be the best of the twenty-three sent in, and the committee has accepted them.

ARCHITECTURAL SOCIETIES.

SHEFFIELD SOCIETY OF ARCHITECTS AND SURVEYORS.—At the annual meeting of the members of this Society, held last week, the eighth annual report of the council was read by the hon. secretary (Mr. C. J. Innocent). It congratulated the members on the satisfactory condition of the Society, both financially and numerically. Several members had been advanced during the year from the student to the associate class, and new members had been received. Two lay members had also been admitted—Messrs. B. Bagshawe and W. J. Gardner—and the Council think that many other citizens would become members if they knew it was open to them. Dr. H. C. Sorby has become an honorary member, and has intimated his willingness to assist the Society. The report dealt in detail with the work of the Society for the year. The sketching class had done a considerable quantity of good work. The prizes offered—3*l.* 3s. by the President (Mr. Gibbs) and 1*l.* 11s. 6d. by the Society—were awarded, the former to Mr. F. W. Chapman and the latter to Mr. J. C. A. Teather. In the designing class the prizes—2*l.* 2s. and 1*l.* 1s.—were awarded to Mr. J. C. A Teather and Mr. J. V. Woffenden. The Council expressed their pleasure at the improvement in the work of the students, and the students recorded their appreciation of the kindness of Mr. Gibbs, to whose interest in them much of the improvement was due. The report also alluded to the award of the School Board with respect to a school at Tinsley Park, which was so much at variance with the conditions that the competitors sent a protest to the Board, and the Council forwarded a letter of complaint, but no satisfactory reply was received. The Council hope to visit this summer Wentworth House and Hardwick Hall, where Mr. Bagshawe will read a paper to the members, and lectures are expected by Dr. Sorby, Mr. Paul Waterhouse, and Mr. Hugh Stannus. The treasurer's statement was read by the treasurer, Mr. F. Fowler. It showed the balance in hand at the present time to be 64*l.* 0s. 6d., being an increase of 59*l.* 12s. 6d. above the balance at the beginning of the year. The result of the ballot for officers for the ensuing year was:—President, Mr. Charles Hadfield; vice-president, Mr. R. W. Fowler; treasurer, Mr. F. Fowler; hon. secretary, Mr. C. J. Innocent; Council, the above officers and Mr. T. J. Flockton and Mr. E. M. Gibbs (ex-offico), and Messrs. T. Winder, J. Smith, W. H. Lancashire, H. W. Lockwood, and W. C. Fenton. Messrs. F. W. Chapman, C. M. Hadfield, C. F. Innocent, J. B. Mitchell Withers, and J. R. Wigfull were elected a committee to manage the sketching class.

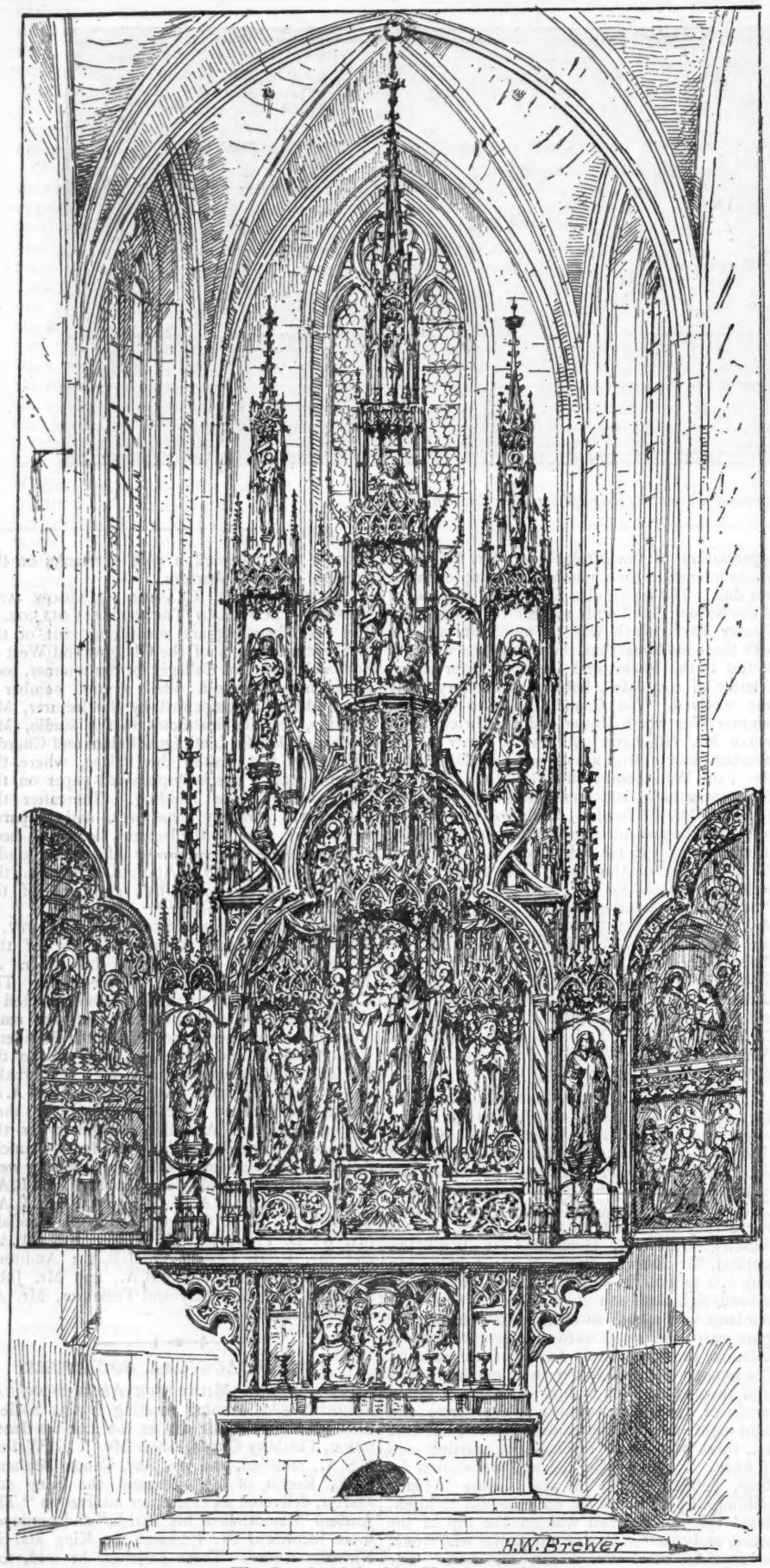
EDINBURGH ARCHITECTURAL SOCIETY.—On the 13th inst. about fifty members of the Edinburgh Architectural Association visited George Heriot's Hospital School under the leadership of Mr. Donald A. Gow. Leaving the school, the visitors proceeded to the Royal Hospital for Sick Children in course of construction at Rillbank, where they were met by the architect, Mr. G. Washington Browne. Describing the plans of the hospital, Mr. Browne stated that the wards ran from east to west in order that they might have as much light and sun as possible. There were four large wards, each with twenty-four beds; one spare ward, and small wards for observation and isolation, providing in all for about 120 patients. The nursing staff was larger in a children's hospital than in one for adults, and there it would consist of five sisters, twenty-one day nurses, and eight night nurses. With resident doctors, matrons, &c., there would be a medical and nursing staff of forty. He described the accommodation for these, pointed out as a new feature in such buildings a play alcove for convalescent children, stated that the kitchen was on the top of the house, and that for twelve domestics who would be required there was a servants' hall. The cooking had to be done principally by gas. All through the building the ventilation had to be by natural, and not mechanical means, and the heating, in four sections, by low-pressure hot water in coils and pipes. The artificial light was to be electric, and for that they were laying down their own plant, with two boilers, engines, and dynamos. Either engine might be driven by either boiler, so that they were safeguarded from a breakdown of the light. There would be 404 lamps of 16 and 8 candle-power. They were also laying down their own steam laundry in Sylvan-place. In afterwards showing, on the various floors, how the plans had been realised, he drew attention to the absence of ornamental plaster work, and remarked that the hospital was constructed in a purely utilitarian spirit. Mr. Browne was awarded a vote of thanks on the proposal of Mr. Robertson.

ARCHITECTURAL CLASSES, GLASGOW AND WEST OF SCOTLAND TECHNICAL COLLEGE.—The first sketching and measuring visit of the architectural classes of the Glasgow and West of Scotland Technical College, for the summer, took place on the 15th inst., when a good number of the students, accompanied by the lecturer, Mr. Gourlay, and the instructor in the studio, Mr. Lochhead, left for Linlithgow Palace and Church. The party first visited the Palace, where the lecturer read a specially-prepared paper on the architecture of the building. Thereafter the church was carefully gone over, and prepared notes were read by the lecturer, he having been aided in their preparation by information kindly supplied by Mr. John Honeyman, A.R.S.A., the architect for its restoration, and one of the Governors of the College.

NOTTINGHAM ARCHITECTURAL SOCIETY.—The Twenty-second Annual Meeting of this Society was held on the 3rd inst., Mr. A. N. Bromley, F.R.I.B.A., in the chair. The Council reported as to the business transacted in the year, and a statement of accounts was read. Votes of thanks were accorded to the President, Vice-President and Secretary, and also to the Institute of Architects for the "Journal," and the Architectural Association for "A.A. Notes," and other societies (allied) for their Annual Reports. A ballot was taken for the election of President, Vice-President, Council, Auditors, and Secretary, when the following were elected:—President, Mr. John Howitt, F.R.I.B.A.; Vice-President, Mr. A. N. Bromley, F.R.I.B.A.; Council, Mr. A. R. Calvert, Mr. A. H. Goodall, Mr. W. D. Pratt, Mr. H. Walker, F.R.I.B.A., and Mr. F. B. Lewis, A.R.I.B.A.; Auditors, Mr. A. W. Brewill, F.R.I.B.A., and Mr. John Sander; Hon. Secretary and Treasurer, Mr. A. Ernest Heazell.

ARCHÆOLOGICAL SOCIETIES.

LONDON AND MIDDLESEX ARCHÆOLOGICAL SOCIETY.—An evening meeting of this Society took place on the 9th inst. at the London Institution, Finsbury Circus, when Mr. J. G. Waller, F.S.A., presided, and the Rev. Canon Benham, B.D., Rector of St. Edmund the King and Martyr, delivered an extempore address on "The Ancient Memorials of his Parish," and produced some records of St. Edmund the King and St. Nicholas Acons. These parishes, he said, formerly had two churches, but both were destroyed in the Great Fire of 1666; that of St. Edmund's only was rebuilt, and since then the two parishes had run together. The registers of St. Nicholas Acons dated back to the year 1589, and those of St. Edmund's to 1670. The former showed many entries connected with the Vanbrugh family, Sir John Vanbrugh, the architect, having been baptised here. Several entries showed how unwilling people were to hold offices in former days, and paid fines. Amongst others, Charles Vanbrugh paid his fine for not serving the office of churchwarden. Many extracts were read referring to the Great Plague and other matters. Mr. Herbert Jones, F.S.A., next read a paper on "Roman Remains recently found in Threadneedle-street." These were dis-



The Reredos, Schnekin Chapel, Augsburg.

covered during excavations which were recently made on the site of No. 62, Threadneedle-street, between the Sun and the North British Insurance Offices. A Roman bath (in cement) was found about 30 ft. below the surface; this was destroyed by the excavators in the course of the work; a photograph of this was shown to the meeting, as also some portions of the bath, and Roman tiles, &c. Mr. M. A. Saunders read a short paper describing the removal of the last of the City Almshouses for the "Deserving Poor," known as Ayre's Charity," in Moorgate-street Buildings, recently pulled down. We believe the Charterhouse is now the only Asylum left within the walls of the City.

ENGINEERING SOCIETIES.

CIVIL AND MECHANICAL ENGINEERS' SOCIETY.—At the ordinary meeting of this Society, on the 10th inst., a paper was read on "Laundry Machinery," by Mr. H. Coward, in which he dealt with various forms of washing, wringing, and ironing machines, with the drying of linen and the various principles involved in carrying out, in a thorough and satisfactory manner, the proper cleansing of wearing apparel and other articles which are included in the general term of "household linen." A special point of interest in the paper was that of a process of boiling flannel without hardening or prejudicially affecting it, this being done without the use of any chemicals or additions to the water other than those usually employed. Diagrams and models in illustration of the subject were exhibited, and a long discussion ensued, in which the President, Mr. C. T. Walrond, A.M.Inst.C.E., the Honorary Secretary, Mr. E. H. G. Brewster, A.M.Inst.C.E., M.I.M.E, &c., Mr. E. Taylor, Mr. A. W. Ackermann, A.M.Inst.C.E., Mr. R. E. Phillips, A.M.Inst.C.E., and others, took part.

Illustrations.

THE FUGGER AND THE SCHNEKIN CHAPELS AT AUGSBURG.

THE fine old city of Augsburg contains three chapels erected during the Middle Ages by the great and wealthy family of the Fuggers. The first "Fugger Chapel" forms a church for the great almshouse called "The Fuggerei"; the second is attached to the nave of the beautiful Church of SS. Afra and Ulrich; and the third is situated at the west end of the nave of the Church of St. Anne. The last-mentioned is the one which we illustrate.

The Church of St. Anne was built between the years 1472 and 1510, but was very much modernised when it was made over to the Lutherans after the treaty of Munster. One very singular alteration appears to have been made at this time; the high altar was removed from the east end, and a new one was set up in the Fugger Chapel at the west end, forming that portion of the church into a quasi-chancel.

The walls of St. Anne's Church are covered externally and internally with plaster, and with the exception of the vaultings of the nave and aisles, no old work is now to be seen.

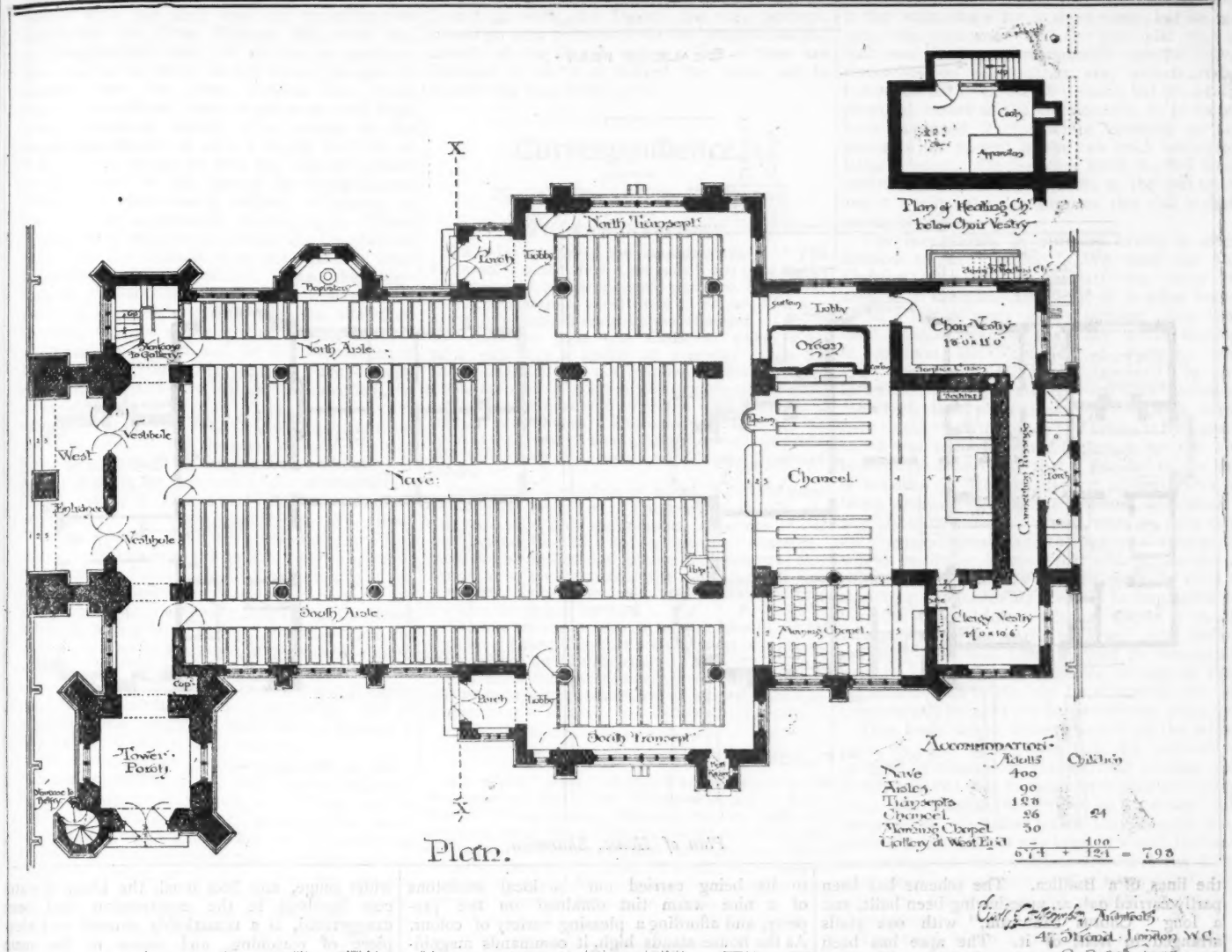
The Fugger Chapel was undoubtedly, before the alterations to which we have alluded, separated from the nave of the church by a screen, probably of metal; its floor is still raised two steps higher than the rest of the church. In the west wall of the chapel are four arched marble recesses, which are not in a line with each other, but form a very slight angle. These recesses are filled in with richly-carved monumental reliefs of a very uncommon character, at any rate for Germany. They are in low relief, and are executed in fine statuary marble. The two outer compositions represent the armorial bearings of the Fugger family, borne up by figures in Eastern costumes (a Persian and an Indian), in a building crowned by domed vaulting, the whole represented in perspective and filled in with trophies, wreaths, allegorical figures, &c., in the Italian style of the earlier part of the sixteenth century. The two inner recesses are occupied by reliefs representing sarcophagi with recumbent figures resting upon them, and sacred subjects filling in the upper portions of the arcades. One of these represents the Resurrection, but the other has been very much mutilated, and is not quite intelligible. Above these four recesses is a balustrade of marble, forming a gallery in which is a fine old organ with painted wings, with a little choir-organ in front, which also has painted wings. This organ is adorned with a good deal of excellent carving, and in the "shades" of the centre compartment are two angels bearing a tablet inscribed with the date 1512. The whole of this work—recesses, screen, and organ—was built at the expense of three brothers of the Fugger family, and would appear to date between the years 1505* and 1512, which makes it very interesting, as it is probably the earliest example of pure Renaissance design in Germany, no indication of Gothic influence being anywhere visible. There is a tradition that the organ was "designed by Holbein," and that the wings of the small choir-organ were painted by that master.

As, however, there were three Hans Holbeins, all Augsburg men, the probability is that, if any of them had anything to do with this organ, it was the *second*, not the third, who is so well known in England by his magnificent portraits; in fact, he could not have designed this work, which is dated 1512, as he was only fourteen years of age at the time.

The very fine paintings upon the shutters of the great organ are by Hans Burgkmair, one of the most celebrated of the Augsburg school of painters of the earlier part of the sixteenth century.

The sculptured reliefs in the recesses of the

* This is an "obit date," so probably the work is rather later.



Design for Church near Preston.—Plan.

screen are said to be the work of "Candido," or de Witte (the former being simply an Italianisation of the German "Witte"). Be this as it may, there can be no doubt whatever that these carvings are either by an Italian, or a German who had studied in Italy. A most curious proof of this is furnished by the fact that, in the perspectives introduced into the side panels, iron ties are represented at the springing of the vaultings. Now, no German or Frenchman would ever have done this unless, as was the case with "Candido," he had received his art training in Italy. We are unfortunately unable to find out for certain who it was that really executed these fine works, nor are we sure whether the "Candido" referred to is the same man who executed some works at the old palace in Munich and at Landshut. There is a good deal of very interesting Early Renaissance work in Augsburg which is of a very different character to that generally found in Germany, and it looks as though it were the work of Italians, or possibly of Germans who had been brought up in Italy. Now it is known that "Candido" studied in Italy, but his works at Munich, and in Castle Transnichts, at Landshut, singularly enough, are less Italian in character than the Fugger monuments at Augsberg, and it has struck me that it is probable that just as there were three Holbeins and two Burghkmairs in Augsburg, there may have been two Candidos—if a Candido was really the sculptor of the work in the Fugger Chapel.

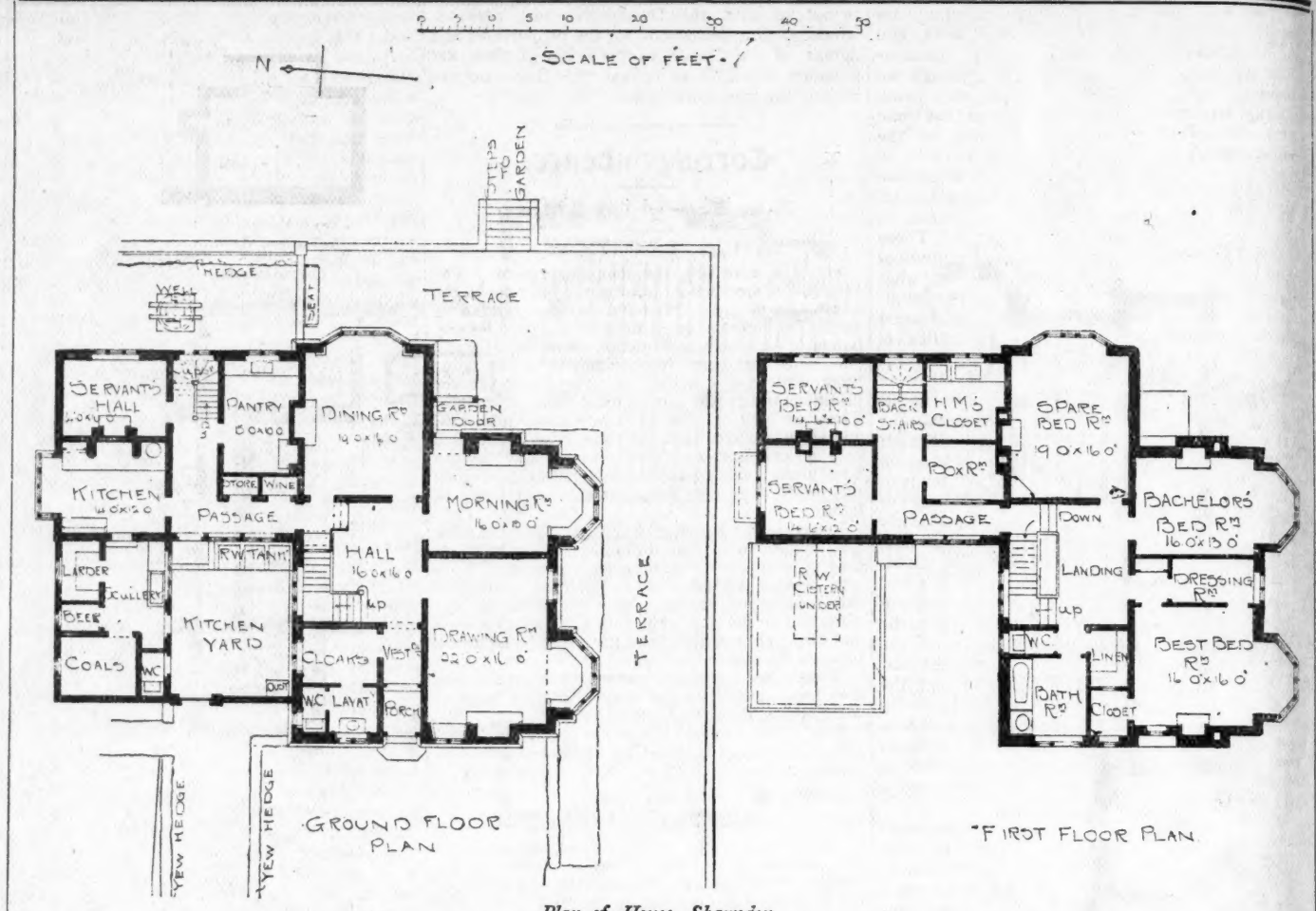
Now we come to the singular fact that five years later than the Fugger Chapel another great and wealthy family in Augsburg, the Schnekins, were erecting at the church of SS. Afra and Ulrich, in the same city, a monumental chapel of the most opposite character—that is to say, a building in quite pure Gothic style, without any admixture of Renaissance—so that here we have two wealthy families, one employing an architect to erect a purely Italian chapel, and another patronising an architect who was working in the pure Gothic style, just as we find things going on at the present day. The altar of the Schnekin chapel is dated 1517, and the chapel is over the sacristy, on the north side of the choir of the church of SS. Afra and Ulrich. By rights we ought to specify that it is the "Catholic parish church of SS. Afra and Ulrich," because there is a Protestant parish church of the same dedication, which leads to considerable confusion in describing the churches, and even the indefatigable Kugler in his "Kunstgechichte" indexes this very church incorrectly, naming it as *two distinct churches*, one dedicated to St. Afra and the other to St. Ulrich. There *are* certainly two churches, but both are dedicated to SS. Afra and Ulrich, and the only possible way of distinguishing them is to state to which religion the one in question belongs.* The (Catholic) parish church of SS. Afra and Ulrich is a very noble example of a third pointed tower church of grand dimensions, 318 ft. long, 94 ft. wide (over nave and aisles), and 100 ft. to the crown of the vaulting. The nave was commenced in 1476 by an architect named Hans Luitpold, but the choir was not begun until the year 1500, under the celebrated architect and sculptor, Burkost Engleberger, who also designed the aisles and pulpit of Ulm Cathedral. No doubt Engleberger's work included the Schnekin Chapel, which must have been very little later than the choir, but was completed earlier than the latter, which was not entirely finished until the close of the sixteenth century. The Schnekin Chapel, however, was certainly finished in 1517, as the beautiful altar bears that date. The reredos is a very fine work, carved in pine-wood, gilt and painted. The triptych is rather singular in arrangement, as the doors have very long hinges, so that the extreme outside statues and canopies are seen whether the doors are open or closed; in the former case they show between the hinges, and in the latter outside the doors. There is another feature which we have met with elsewhere, and that is the glazing of the little window-like piercings behind the figures and under the canopies. The saints represented are as follows, commencing at the top:—1, St. John the Baptist, to whom the chapel is dedicated; 2, St. John baptizing our Lord; 3, 4, 5, and 6, Angels bearing emblems of the Passion; 7 (in centre), Madonna and Child; 8, St. Catherine; 9, St. Afra; 10, St. Ulrich; 11, St. Anthony; 12, St. Ulrich; 13, St. Rock; 14, St. Boniface. The pictures on the wings or doors represent the Annunciation, the Presentation, the Nativity, and the Judgment of Solomon; but these have unfortunately been so abominably retouched, some seventy or eighty years back, as to be ruined. The altar itself is perfectly plain, with a molded "mensa" and an arched perforation in the centre. The work is attributed, and I think correctly, to Tilman Riemenschneider, of Wurzburg, as there are more than one singularity of treatment in common between this and Riemenschneider's altar at Rothenberg, in addition to which the figures, allowing for difference of material, greatly resemble those on the columns of the Marienkapelle at Wurzburg, the tomb of St. Henry at Bamberg, and the monument of Bishop Scherenberg (illustrated in the *Builder* a few years back) in the Cathedral at Wurzburg.

The entire absence of any kind of Classical ornament from the details of this altar is very singular when we consider its date, 1517, and the fact that the Fugger Chapel, which was certainly completed five years earlier, is quite as purely Renaissance and free from Gothic detail. These examples of two distinct styles of architecture being carried on at the same time serve to show that the present architectural practice can derive some countenance from that of the Middle Ages; and very likely if we knew all we should find that architect's patrons in the Middle Ages did not differ very much from those of the present day, and were just as full of whims and fancies. H. W. B.

* Baedeker speaks of a "Protestant and a Catholic Church, both dedicated to St. Ulrich," which is also incorrect.

CHRIST CHURCH, CHELTENHAM.

THIS church is a large building, erected rather more than fifty years ago, in the "Early English" style then prevalent, with very deep galleries and no chancel. In 1886 Professor J. H. Middleton was consulted as to improvements, and recommended that the style of the existing building should be ignored, and the whole remodelled on



Plan of House, Sharnden.

the lines of a Basilica. The scheme has been partly carried out, an apse having been built, and a long "Chorus cantorum," with oak stalls arranged in front of it. The apse has been decorated with important paintings. The roof and semi-dome are painted by Mr. W. B. Richmond, with figures of our Lord, the Apostles, St. Michael, St. George, &c., a very large and splendid work. The walls have panels of the Annunciation, Visitation, Nativity, and Presentation, and the reredos a triptych of the Resurrection, all by Mr. J. Eadie Reid. The marble work is partly executed by Mr. H. H. Martyn, partly by Messrs. Boulton. The drawing is by Mr. Orlando Middleton.

HENRY PROTHERO.

DESIGN FOR A CHURCH NEAR PRESTON.

THIS design was submitted in open competition. The building was planned with a view to being carried out in sections according to the means at the disposal of the Building Committee, and when completed would have provided seating accommodation for about 700; the gallery over the west entrance and vestibule would have provided further seats for about 100 children. The exterior would have been in local stone, and the roof covered with Broseley tiles.

The drawing was exhibited in last year's Royal Academy. Messrs. Clark & Hutchinson are the authors.

DECORATION FOR CHURCH, PYE-STREET, WESTMINSTER.

THIS is a sketch design by Mr. John Belcher for oak stalls and painted decorations to the walls of the church referred to.

The drawing was exhibited in the last Royal Academy exhibition.

NEW HOUSE, SHARNDEN,* NEAR MAYFIELD, SUSSEX.

THIS house has been recently erected on a charming site for Mr. R. Gordon Shaw as a summer residence.

The materials are red Crowborough bricks for the walls, with bright red tiles to the roof, and the external woodwork is painted white. The terrace, as shown in the drawings, was at first intended to be executed in red brick similar to the house, but was slightly varied in execution owing to its being carried out in local sandstone of a nice warm tint obtained on the property, and affording a pleasing variety of colour. As the house stands high, it commands magnificent views over the Weald of Sussex right away to the South Downs, and as it has the additional advantage of being on an old site, a portion of the gardens were already in existence, and the line of trees shown at the back of the house in Mr. Paul's drawings sheltering it on the north and east are not due to the fertile imagination of the artist, but are really there. Since the drawings were made, however, the ground immediately below the terrace on the south and east sides—shown as a field—has been laid out as additional pleasure-grounds, very much improving the appearance of the place. The stables are situated a short distance from the house, and are entirely screened from it by thick belts of trees, and a small house which previously existed close to the entrance-gates has been converted into two cottages for the use of the gardener and coachman.

The whole of the building work was carried out by Messrs. Norman & Burt, of Burgess-hill; the sanitary plumbing and water supply being by Messrs. Dent & Hellyer. Mr. A. Sandall acted as clerk of works.

H. O. CRESSWELL.

* Not "Shardon," as given on the plate: a mistake for which the inaccurracies of the R.A. catalogue are mainly responsible.

Books.

A History of the Great Western Railway: being the Story of the Broad Gauge. By G. A. SEKON. London: Digby, Long, & Co. 1895.

THIS is, unfortunately, a badly-written book on a very interesting subject. It narrates the inception of the Great Western Railway, with a pretty full account of the now ancient history of "the battle of the gauges," and continues the general history of the line and its working down to the day when the great operation of conversion of the whole line to narrow gauge was carried out with a speed and an absence of oversights or accidents which, however some of us may regret the occurrence itself, was one of the most creditable and remarkable operations in the whole history of the line. A great part of the interest of the book consists in the quotations from the reports of Brunel to the committee while the gauge question was still under discussion. Brunel's principal report, showing the advantages of a wider gauge, and how much the ideas of extra cost involved in the construction had been exaggerated, is a remarkably shrewd and clear piece of reasoning, and seems in the main unanswerable. It is characteristic of Brunel's determination and foresight in pushing his views, that in the Bill for promoting the railway he contrived to avoid all mention of the width of gauge, so that his Company might not have their hands tied.

The misfortune for the Great Western Company, as the author mentions, was that the introduction of the broad-gauge came just too late. The narrow-gauge had sufficiently taken the lead to be regarded by many as the established and authorised gauge, and to have become incorporated with very large vested interests. Even in spite of these circumstances it is possible that the broad-gauge might have held its own as the trunk-gauge for its district of England, and compelled the adoption of the same gauge for the minor lines most directly connected with its system, had the line been worked with more enterprise than for many years it was; though, of course, the break of gauge would always have had to come at some point. It was a great pity Brunel did not get his hand into the railway system of England at an earlier date; it would have been greatly to the advantage of English railway travelling.

Among the peculiarities in the construction of the line which were due to Brunel's originality was that of keeping it all as nearly level as possible, and concentrating the changes of level at one or two points, where bank-engines would be required to assist the trains up special gradients. With the modern locomotive these gradients are surmountable without such assistance; in Brunel's time they were not, and the wisdom of his policy may be questioned; but from his point of view there is a good deal to be said for it. He wanted a line eminently adapted for fast travelling, to which, with the engines of his day, a considerable number of gradients would have been a serious obstacle, while the cost of keeping up bank-engines at one or two points on a long line would not have been material.

The description of the manner in which the original Great Western roadway was constructed, which is given in detail, is of interest; though this we think does not do so much credit to Brunel's genius; it was complicated and very costly, and could not have succeeded after all in one of the great objects in railway building—distributing the weight of a train over the largest base of ground—as well the cross-sleeper system. Most

people who use their eyes in travelling are aware that the Great Western rails were laid on longitudinal balks of timber, a considerable length of which is still down, though we observe that the cross-sleepers are being rapidly substituted; but few are aware that these were carried on vertical piles, which in the embankments were of such a length that 6 ft. to 8 ft. of them was to go into the original surface of the ground at the base of the embankment. This was a most costly method, of course, as the piles were at intervals of every 15 ft. There is mention of cross-timbers under the longitudinal rails, but the account does not state at what intervals these were placed. After the longitudinal timbers had been laid, a hard-wood plank 1½ in. thick and 8 in. wide was nailed on to them, with an upper surface sloping inwards at an angle of 1 in 20, and on this the rails were bolted. Altogether this seems a very complicated system, and after all did not present the advantage of the simple surface cross-sleeper system, whereby the even weight of the train on the two ends of the sleepers in itself tends to keep them level under the pressure, and makes it hardly possible for one rail to dip independently of the other. That this kind of weakness occurred at an early period on the Great Western Railway, when the ground was in a bad state, is obvious from the history; not to speak of the tendency of the longitudinal balks to dip at the ends as the weight went over them. One of the worst accidents that has happened on the Great Western, when the "Flying Dutchman" left the rails a good many years ago, was probably due to a dip in the sleeper when the ground was in a soft state. In this respect, therefore, Brunel's road was unscientific as well as costly. But in regard to the gauge we hold that he showed a true instinct; only it came too late.

Mr. Sekon's book contains some of the anecdotes characteristic of the early days of railways which are always interesting as enabling one to realise the position when the whole system was a new attempt on its trial. One of the conditions imposed on the company was that they were to build no station at Slough; this was on the moving of the Eton authorities, who feared that the railway would demoralise the boys. There was no condition, however, forbidding them to stop their trains at Slough, and they hired two rooms in a public-house close to the line, as waiting-rooms, and stopped and took up passengers whenever they pleased. The story about Babbage going down on a special on the up line, on the assurance that no train was due, and coming near being smashed by Brunel coming up the line unexpectedly driving his own engine, is a still better illustration of the light-heartedness of early railway arrangements: we may refer the reader to the book, where it is told in detail in Babbage's own words.

The book contains a good deal of information; it fails only in a literary sense, and might have been made much more interesting reading than it is.

Spon's Architects' and Builders' Price-Book. By W. YOUNG, architect. London: E. & F. N. Spon. 1895. *Laxton's Price-Book for 1895*. Originally compiled by WILLIAM LAXTON. Seventy-eighth edition. London: Kelly & Co.

THESE two books maintain their value, and come out with added chapters, mainly on the subject of electric work. Of the two it may be said that Spon's is more an architect's book, Laxton's a builder's book, going more into detail as to pricing and details of work. The new information in Laxton appears fuller, and, in fact, the whole book is more bulky than Spon's, and, perhaps, not so methodically arranged. The new London Building Act is printed in full in it, as the old was in former editions. Spon does not include this, the compiler, perhaps, rightly thinking that architects are certain to have the Act in other forms, and it would but add to the volume and cost of the book. The alphabetical arrangement is maintained, by which the process of turning to what one wants is much facilitated. Of the two we prefer Spon, but then we write from the point of view of the architect. Probably Laxton is the more useful one to contractors, always allowing for the fact that prices are taken at a rather high rate, and must be taken *cum grano* where competition is close or where the best work is not contemplated.

In regard to one point in Spon, we have before asked why the Greek Doric is not included in the diagrams and descriptions of the Orders. If the Ionic may be taken as in the main similar whether under the head of Greek or Roman, this is not so with the Doric. No one, perhaps, would go to a price-book for the proportions and details of the Classic orders; but if they are included at all, it is behind the times not to include the true Doric order.

Correspondence.

To the Editor of THE BUILDER.

THIN PARTITIONS.

SIR,—In criticising the manufactures of "The Fireproof Construction Company" you refer to the advantages of a 3-in. plastered partition, but (so far as this desideratum goes) there is no need for any patent or expensive construction whatever. I know one place at least (the Canaries) where 2-in. brick walls are a matter of everyday usage for partitions which are not required to carry weight. These are built of solid brick in quick-setting stuff, and when plastered both sides the total thickness is only 7 centimètres. There is probably not an hotel in the Canary Islands, large or small, in which this work does not occur, and I never heard of failure.

Referring to a schedule of prices, I find the price per square mètre of "Fabique de ladrillo de 0·05 m. con dos paramentos enlucidos"* is 3·20 pesetas (2s. 8d.), and a Spanish "maestro" can build his wall to-day, plaster it to-morrow, and distemper it the next day, with a minimum of fuss and dirt. He can also build it to be self-supporting between the ends if need be.

There is no reason why such work should not be done here, unless it be that nothing short of a patent will convince the British public.

If a more detailed description of the materials and *modus operandi* would be of interest I shall be pleased to give it. NORMAN WRIGHT.

PRINCE'S COURT.

SIR,—In a "Note" of March 16, (page 199 *ante*) you mention that John Wilkes is stated to have lived in Prince's-court, Westminster, in 1788. A few days ago I saw a holograph letter written by the Chevalier D'Eon, in 1791, and addressed to "Miss Wilkes, Princess [*sic*] Court, Westminster." Wilkes married in 1749; his daughter Mary died at her house in Grosvenor-square, on March 3, 1802.

W. E. D.-M.

The Student's Column.

BRICKS AND TERRA-COTTA.—XVI.

EFFLORESCENCE (*continued*).

BURNING now to incrustations due to purely chemical causes, it may be remarked that they rarely present the same character in any two bricks made of different earths. It frequently happens that the brick manufacturer is also a producer of whiting, lime, cement, &c., and the by-products resulting therefrom are freely used with the raw earths in preparing them for even high-class bricks. In most instances it happens that the brick-maker has not the faintest conception of the chemical and metallurgical effects of the earths used. He leaves that to an "intelligent" foreman, who, by dint of long experience, and continual shifting from one brickyard to another, is possessed of many "secrets." We mention this as it will account for the divers manners in which bricks from one yard produce chemical incrustations, which vary in character when traced over a long period.

The incrustation is frequently developed before the bricks leave the kiln; as this may seem somewhat incredible in view of the generally accepted ideas in reference to the cause of "efflorescence," it may be stated that this has come under our own eyes in no less than eight yards visited, or we should have hesitated to mention the circumstance. In three cases it was found to occur in the kiln within seven days after the bricks were commenced to be "drawn"; in the remaining five instances the bricks were in for periods varying from a week to three weeks. We are in a position to state also that in at least four of the cases mentioned no rain or wet could have been instrumental in bringing out the incrustation, inasmuch as the kilns were practically closed, whilst in two other instances they were partially muffled. We are very loth at this stage of our inquiry—which bids fair to be a very interesting one—to promulgate any theory in reference to incrustations formed in the kiln (which, by the way, become much more manifest when the bricks are exposed to the atmosphere for a short time), but we are under the impression that the particular class of fuel used is largely responsible therefor. Our researches on this matter are, unfortunately, rather limited in extent at present, but the actual chemical nature of the efflorescence, so far as we have examined it, frequently presents certain elements not present in the raw brick before the latter is burnt. On the other hand, we find these additional chemical constituents in the fuel used, and it is only natural to suppose that that is their source of origin.

The incrustation in ordinary bricks is often alluded to as "salting." We have not the slightest objection to this if the term be used in a chemical sense, for it is often found to be a salt of some kind; but we know that most people imagine that the white coating is common salt (chloride of sodium), and that compound is rarely involved in its formation. Some years ago, quite an animated discussion took place in our columns with reference to the "efflorescence" of bricks at Swansea; and it was seriously stated (although we did not endorse the statement), that it was due to the use of sea-sand in the manufacture of the bricks, it being assumed that the incrustations were merely exudations of sea-salt. From what we have said on previous occasions in this series of articles, it will be readily understood that with an excess of chloride of sodium in a brick-earth, or even a moderate amount of it, it would be impossible to burn the material into a brick at all, as it would promptly cause the earth to "run" long before sufficient heat had been applied to thoroughly burn it. It is absurd, therefore, to suggest that incrustations on bricks can be altogether due to common salt brought out by percolating moisture.

This leads us to observe that in all the brickyards we have visited, save two, the responsible persons in charge of the burning process distinctly believed that bricks were melted according as it was possible to get up to a certain high temperature. In other words they thought that, given a brick-earth of any kind, it would be fused on arriving at that temperature; and the kilns were fired accordingly. We recommend this matter to the notice of "Technical Education" Committees.

The taste of an incrustation may be saline (though not due to common salt), acidulated, or alkaline. When of chemical origin it is in most cases soluble, and wears off by the action of rain and wind; but often reappears after a time. This saline effect is produced through a chemical affinity which subsists between the acids in the atmosphere, and the acids and alkali contained in the lime and magnesia in the bricks, as well as in the mortar or cement. The effects are materially aggravated when chalk is used to an inordinate extent. Special importance, therefore, should be attached to the discovery in bricks of soluble salts which lead to the incrustation. As the complete absence of these is hardly to be looked for, a certain number of experiments would define a limit which should not be exceeded. This limit would be fixed after consideration of the relative effects of different salts in various quantitative proportions. The question of saline crystallisation is, however, less easily treated, as in this instance the active cause not only forms an integral part of the brick, but may to some extent, be composed of salts which are introduced whilst the brick is in position. This condition is usually found in connexion with embankments, sewers, &c., in which cases the brickwork is exposed to various influences especially calculated to produce the effects in question. When derived from the substance of the brick itself there can be no doubt that the material is decomposed during the process. A particular test in connexion with saline incrustation can hardly be established at present, but in any case its effects from the point of view of decomposition would be less marked than those of frost.

Mr. Wm. Trautwine, an American author who has probably investigated the cause of the efflorescence of bricks in greater detail than any other observer, notes that, although in some instances it can be shown that the mortar is responsible for the mischief, it is equally clear that in others it is due to the composition of the bricks themselves. He remarks that, occasionally, the coating is tinted yellow, possibly from traces of oxide of iron, or hyposulphite of lime. A brick of this description taken haphazard was examined somewhat in detail. Its coating had a peculiar taste, due to sulphate of magnesia, and in order to ascertain whether this existed also in the interior of the brick, the latter was crushed, and placed in water. At the

* "Brick wall 5 centimètres thick with (and including) both sides plastered."

end of a week the water had dissolved out a mixture, consisting mainly of the sulphates of magnesia, lime and iron. This brick contained no traces of sulphites, soluble carbonates, or soluble chlorides. Many other incrustations examined were composed almost wholly of sulphate of lime and magnesia, with traces of iron and alumina; no carbonates were present.

As many persons yet believe that efflorescence is primarily due to percolating moisture (as, indeed, it is in some instances), it may be well to note that sulphate of magnesia possesses the peculiar property of "blossoming" in dry air. Bricks which, apparently, contain more than their full share of the sulphates of magnesia and lime, become much whiter in dry weather than others around them not thus constituted. Seeing that these sulphates are mainly due to the volatilisation of iron pyrites in the coal used in burning (though, perhaps, indirectly), the easiest way to get rid of them is either to use a better quality coal, or to entirely muffle the kiln. The latter, from other reasons, connected with brittleness, could not be adopted universally. It must be remembered, however, that similar effects may be wrought in the atmosphere of a manufacturing town, due to the combustion of coal. Nevertheless, the small amount of sulphuric acid diffused in the air is insufficient to produce any effect until after long exposure, unless in very exceptional circumstances, and seeing that new bricks are more rapidly incrusted than old we must yet seek further and, it may be, concomitant causes. Of course, silicates of lime and magnesia in semi-vitrified bricks are somewhat protected from the action of the air.

In those parts of the country where lime is made from dolomite, the incrustation is unquestionably due to the decomposition of mortar compounded of that. Dolomite, typically, is composed about half of carbonate of lime and half carbonate of magnesia, and this, when treated and made into mortar, is very susceptible of the influence of sulphurous fumes. As the sulphate of magnesia dissolves and effloresces, the mortar is disintegrated, and spreads its influence to the neighbouring brick. To avoid this defacement, lime free from magnesia should be employed in the mortar.

It is commonly believed that incrustations on bricks may be prevented by using Portland cement instead of mortar; but this pre-supposes two things—viz., that the white coatings are due entirely to the influence of the mortar, which is by no means the case; and secondly, that the cement contains merely a small proportion of magnesia. As a matter of fact, the quantity of the latter in a Portland cement is very variable, depending on the kind of cement. In a fairly good one it is reasonable to expect but a very small amount, when it becomes involved with the argillaceous constituent, and is no doubt protected by the latter to a certain extent. Given the same brick, it would seem that it effloresces more briskly when set in the average mortar than in average quality Portland cement, that is, within limits, and in certain conditions of the atmosphere.

Under the microscope, chemical incrustations present a variety of features into which it is not our purpose at the moment to enter. The vast majority of them are distinctly crystalline, and exist as aggregates of small crystals. These are usually as white as snow, but on certain varieties of bricks they are yellow, red, purple, and green. The crystals, moreover, appertain to several varieties of minerals, though genetic relationships can often be traced between them. In the flame of the blowpipe, in presence of suitable reagents, the existence of iron, calcium, aluminium, &c., may be proved.

We have indicated two or three means of mitigating the causes which lead to this disfigurement; on the whole, the more thoroughly vitrified the brick is the less likelihood is there of its efflorescing—white coatings on Staffordshire blue bricks, for example, are rarely seen. The same may be said where any good brick-earth is thoroughly fired, from which it will be understood that bricks prone to much efflorescence are either not made of suitable earths in the first place, or are not sufficiently burnt. At the same time, a comparatively poor earth in this respect may be neutralised by the employment of fuel containing iron pyrites in the smallest possible quantity, and by the adoption of partially muffled kilns. To carry out these suggestions, however, would be to raise the price of ordinary building bricks all round, and from the commercial point of view this is impracticable. It is not too much to expect, though, that the better kinds of bricks shall be so manufactured as to do away with the possibility of incrustations; at the present time many of these are as bad as the poorer kinds. Indeed, we go so far as to say that the average London stock brick does not incrust to anything like the same extent as do many red-rubbers and bricks made from the point of view of colouration only.

Other things being equal, bricks no doubt effloresce in proportion as they are porous. Thus it is that unsightly incrustations of a permanent character have been removed, and prevented from re-forming for many years by the application of linseed oil well rubbed into the face of the brickwork. That this is successful is beyond question, for one may obtain two bricks of precisely similar kinds from one maker, and after having oiled one of them and placed both out in the open for a few weeks, if any incrustation appears it will be upon that one which has not been treated.

OBITUARY.

MR. GORDON MACDONALD HILLS.—We record the death of this architect, an old member of the profession, who held an honourable though unostentatious position in it. Mr. Hills was articled to a firm of architects at Southampton, subsequently became assistant to Mr. Butler, cathedral architect at Chichester, his connexion with which cathedral lasted all his life. He subsequently set up in practice for himself in London, being chiefly employed in ecclesiastical work, and building a good many churches in different parts of England. He held the appointment of Diocesan Surveyor in the dioceses of London, Rochester, and St. Albans; was elected an Associate of the Institute of Architects in 1858, and was for some years Treasurer of the British Archæological Society, and took a considerable part in their congresses. He was much engaged in antiquarian research, and wrote on Irish Round Towers, acoustic vases, monastic remains, &c. He had been engaged in preparing for publication the results of many years of research in regard to Chichester Cathedral, to which he had been for a long time architect, and the restoration of which he was shortly to have carried out. His death, which took place on the 5th, was attributed to a great extent to overwork; for the last eighteen months he had been obliged to leave active work to his son and partner.

GENERAL BUILDING NEWS.

CONGREGATIONAL CHURCH, NEW SWINDON.—On the 3rd inst. the new Congregational church in New Swindon was opened. The new building has been erected by Messrs. W. Jones & Sons, of Gloucester, from designs prepared by Mr. T. B. Silcock, B.Sc., Bath. The building, which affords sitting accommodation for about 550 persons, consists of a nave and side aisles, separated by arcading supporting a low clearstory. The building is entered from porches on either side of the main front, and access may also be had from a third porch at the back. The whole of the work is carried out in local brickwork with Bath stone dressings. A feature of the exterior is the brick tower, finished with ornamental coping and surmounted by a turret consisting of eight oak columns supporting the roof, which is covered with sheet copper; at the four angles of the roof are placed four flying dragons, executed in beaten copper and wrought-iron work. The central gable is enriched with pilasters, ball finials, carved apex stone, &c.; and is pierced with a rose window above the moulded strings, and below with a long mullioned window. Over the entrance to the low porch is a moulded and carved stone canopy supported with sculptured angel figures. The sides of the interior consist of low aisle walls pierced with mullioned windows, the intervening spaces being occupied with brick buttresses, with stone caps; the aisles are roofed over at a low level, and immediately above these rise the clearstories. The interior is lighted by means of the western rose window and low mullioned windows in the aisles and transepts, and in addition by the traceried clearstories. All the windows are filled with stained glass made by Mr. Swaine-Bourne, of Birmingham. The choir-gallery is placed in the apsidal termination of the nave, and is separated from the main body of the church by a wide moulded and carved arch. The gallery front and the rostrum immediately below are constructed of polished oak. A gallery is also provided at the west end, approached by a staircase in the tower. The ornamental gas-fittings, as also the whole of the wrought-ironwork, including the dragon terminals, have been executed by Messrs. Mariner, West, & Tylee, of Bath, from the designs of the architect. The stone carving and the sculpture was entrusted to the firm of Messrs. Harry Hems & Sons, of Exeter. The seating is carried out in Canadian oak by Messrs. Bennet & Co., of Glasgow.

ALMSHOUSES, HAMPTON-ON-THAMES.—On the 2nd inst., new almshouses were opened at Hampton. The building is adjacent to the railway station, is one story high, and comprises six separate dwellings, each consisting of a living-room, bed-room, scullery, offices, &c. Two of these dwellings are so arranged that they can be subdivided if necessary, so that the building contains a maximum of eight separate dwellings. The structure has three fronts, in the centre of each being a double porch forming the entrance to two dwellings. The lower part is faced with red brickwork, and the gables and upper part is rough-cast work in white spar. Over each porch "Jubilee Almshouses, 1887," is cut out in cement letters. The upper portions of the windows are lead-glazed with cathedral-tinted glass, and the roof is covered with alternate bands of plain and ornamental Broseley tiles of different shades. The architect was Mr. John Kemp, Surveyor to the Hampton District Council, and the builder was Mr. Robert Richardson, of Hampton Hill.

LIBERAL CLUB, OSSETT.—On the 10th inst. Lord Ribblesdale opened the new club house which the Liberals of Ossett have acquired. The building is situated in Station-road. Mr. W. A. Kendall, of Ossett, was the architect, and the building contract was executed by Messrs. Oldroyd & Sons, Ossett.

HOSPITAL, CLACKMANNAN.—The Combination Hospital for the County of Clackmannan, situated near New Sauchie, Alloa, was opened on the 15th inst. The buildings are from plans by Messrs. John Melvin & Son. There is an administrative block, also male and female wards, 18 ft. by 14 ft. There are likewise two pavilions, male and female wards, having accommodation for six beds each.

MISSION HALL, GRANGETOWN, GLAMORGANSHIRE.—A new mission hall is being erected at Grangetown, from the designs of Messrs. Habershon & Fawckner, architects. The building, which will accommodate between 1,200 and 1,400 people, will cost about 2,500*l.*, and is composed of red brick with Bath stone dressings. The hall is situated on the corner of Corporation-road. Messrs. Knox & Wills are the builders.

AUCTION MART, THORNTON, N.B.—The new auction mart erected by John Swan & Sons, Limited, in close proximity to Thornton Junction, Fifeshire, was opened on the 15th inst. The mart has been built by Mr. Alexander Waddell, Burntisland, from plans prepared by Mr. Storrar, architect, Cupar. It has a frontage of 80 ft. by 40 ft.

REOPENING OF DEWSBURY PARISH CHURCH.—The reopening of this church, the history of which dates back from Saxon times, took place on the 14th inst. A few years ago, says the *Leeds Mercury*, about 19,000*l.* was laid out in rebuilding and enlarging the chancel, vestries, and porches, and in the addition of transepts, the whole from the designs of Mr. G. E. Street, and now the south aisle has been entirely reconstructed, new windows have been placed in the clearstory of the nave, the roof of which has undergone rebuilding, and repairs have been effected in other parts of the edifice. The amount now expended is 4,350*l.* The north aisle has yet to be pulled down, and made to harmonise with the rest of the structure. Before the parish church can be complete the tower will require rebuilding, or at least recasing, new lights inserting, and the addition of another stage, the height at present being under 100 ft. The architect for the recent restoration is Mr. Street, of London, and the contractors Messrs. Wilcock, of Wolverhampton.

PRIMITIVE METHODIST CHAPEL AT ROTHERHAM.—A new Primitive Methodist chapel, which has been erected at Masborough (Rotherham), was opened on the 15th inst. The new sanctuary has cost about 2,300*l.* In connexion with the scheme is a school. The chapel is built of brick, with stone dressings, and covered with Welsh slates. The design is English Renaissance, and accommodation is provided for about 700 people. The architects were Mr. Thomas Howdill and Mr. Charles B. Howdill, of Leeds.

REOPENING OF CARNON DOWNS WESLEYAN CHAPEL, CORNWALL.—This building has just been reopened after alterations and improvements. Mr. Swift, of Truro, was the architect, the carpentry being done by Mr. W. H. Moyle, of Chacewater, and the masonry by Messrs. T. Woolcock & C. Reece, of Feock.

SANITARY AND ENGINEERING NEWS.

SEWAGE SCHEMES, CONISBOROUGH AND DENABY, YORKSHIRE.—On the 4th inst. Major-General H. D. Crozier, R.E., Inspector of the Local Government Board, held an inquiry concerning an application to borrow 1,798*l.* for the completion of a scheme of sewage and sewage disposal for the parishes of Conisborough and Denaby. Mr. G. White, C.E., explained the scheme. The sum of 8,800*l.* was originally borrowed, but was found inadequate.——The Bolton-on-Dearne and Goldthorpe parishioners, at a meeting on the 4th inst., adopted a sewage scheme for the above places, as prepared by Mr. G. White, C.E., Mexborough, and as approved by the Doncaster Rural District Council.

STAINED GLASS AND DECORATION.

WINDOW, PARISH CHURCH, HARROW-ON-THE-HILL.—A three-light stained and painted memorial window was placed last week in the north transept of this church. The subjects represented are "David," "St. Luke," and "Miriam." The win-

dow was executed by Messrs. W. B. Simpson & Sons.

MEMORIAL WINDOW, EGG BUCKLAND CHURCH, DEVONSHIRE.—There has just been inserted in Egg Buckland Church a Memorial Window, given by Mr. P. C. C. Ratcliffe, of Derriford, in memory of Elizabeth C. Ratcliffe, who died 1890. The three main lights of the window contain representations of the subjects:—"Thy faith has made thee whole," the widow's two mites, and the angel announcing the Resurrection to the holy women at the Sepulchre, typifying respectively the virtues Faith, Charity, and Hope. Messrs. Fouracre & Son, of Stonehouse, carried out the work.

MEMORIAL WINDOW, GARRISON CHURCH, DEVONPORT.—At the Garrison Church, Devonport, on the 13th inst., a memorial window presented by the Rev. E. J. Hardy, Senior Chaplain to the Forces, and Mrs. Hardy, in memory of their only son, was unveiled. The subject is "The Crucifixion," treated in the centre panel, the side-lights being filled with figures of the Virgin Mary and St. John. At the foot of the Cross is Mary Magdalene weeping, and near the figure of Christ is an angel holding a chalice. The work has been carried out by Messrs. Heaton & Co., of London.

WINDOW, ST. MARGARET'S CHURCH, LIVERPOOL.—This church has received an addition of stained glass in one of its three-light windows. The work is symbolical of the Incarnation and the Eucharist. The centre light contains a figure of our Lord, vested in dalmatics and cope, holding in one hand the chalice, and with the other giving blessing with the Host. The two side-lights contain pictorial representations of types of the same Mystery; in one Melchisedek and the Kings, with the offering of Bread and Wine, and in the other the Gathering of Manna; there are also smaller pictures of the Nativity and Coronation, and the whole is crowned by a Pelican in its piety. The work was carried out in the fifteenth-century manner, with very elaborate canopy work, the artists being Messrs. Percy Bacon & Brothers, of London.

FOREIGN AND COLONIAL.

FRANCE.—The Minister of Public Works has authorised the Ouest Railway Company to recommence the works for the Invalides station, on condition that the station shall be an underground one, and that a committee of Paris architects shall be appointed to approve of the station entrance buildings, which are only to be one story high. The appearance of the Esplanade des Invalides is not to be materially altered, and the trees that have been cut down are to be replaced by others.——The Jury of Architecture for the Champs Elysées Salon this year consists of MM. Coquart, Daumet, Raulin, Pascal, Ginain, Laloux, Guadet, Garnier, Vaudremer, Loviot, Mayeux, Deslignières, Redon, and Corroyer.*——There is to be an exhibition of drawings and water-colours by Bida at the Durand-Ruel Gallery, to be opened on the 29th.——The President has just inaugurated the new buildings of the "Ecole des Arts du Meuble," founded by the Paris Municipality under the title of "Ecole Boule."——The Municipal Council of Paris has decided that the former "Bourse du Travail" is to be appropriated for use as a Museum of Industrial Art, to be open every evening to artisans, and where lectures are to be given on Industrial Art.——The Post Office Department, in spite of the failure of the former competition, has determined to invite artists and engravers to compete again for the creation of a new set of postage-stamps, designs more artistic than the existing ones.——There is talk of installing illuminated fountains in the Buttes Chaumont Park, similar to those which were such an attraction at the 1889 Exhibition, and which have continued to play at the Champs de Mars in the summer months ever since.——The Council of Paris proposes to acquire the waters of the sources of the Loing and Lunain to increase the Paris water supply.——The cost of the drainage-works which are to be undertaken in Paris is estimated at 35 million francs, and the works necessary for the disposal of the sewage at 30 million francs; this is for carrying a portion of the sewage towards Vriel and Mery-sur-Oise, independently of the irrigation works on the plain of Achères.——M. Bartholdi has just completed a monumental group to be offered to the town of Basle in memory of the assistance given to the Strasburgers by the Swiss in 1870-71. The monument represents Switzerland protecting with her shield Alsace, who is led to her by the genius of charity. Behind this principal group is that of a young mother clasping her infant in her arms, followed by two other children. The whole group is on a pedestal, four mètres high, adorned with commemorative bas-reliefs.——The "Union Artistique du Nord" is to open at Lille, on the 1st of June, an international exhibition of artistic photography.——The death is announced of M. Parteret, architect and "Inspecteur des Travaux" to the City of Paris. The death is also announced, at the age of 88, of the celebrated Lyons painter, Paul Chenavard, well-known for his important decorative works, and a corresponding member of the Académie des Beaux-Arts. To him and his work we shall devote a special notice.

UNITED STATES.—New York is to have a great public library, in which the Astor, Lenox, and Tilden foundations will be united.——The Grand Jury on the Orchard-street disaster at New York condemns the Department of Buildings for not having exercised its authority with sufficient care, and recommends the reorganisation of the Department, with the addition of an "Advisory Board," consisting of two architects (one appointed by the Mayor and one by the American Institute of Architects), one civil engineer, one sanitary engineer, one builder, and one member of the Board of Fire Underwriters.

AUSTRALIA.—Additions are being made to the Government Printing Offices at Sydney.——Several new suburban post-offices are to be carried out in New South Wales.

NEW HOSPITAL, SYDNEY.—This hospital, the design of which is described as "neo-Classic," comprises five blocks, viz., administrative, north, south, and east wards, and operating blocks. The buildings are harmoniously designed, and the internal arrangements for the comfort and proper treatment of the sick are most comprehensive, and, including as they do the results of modern research and invention, are unsurpassed in Australasia. The administrative block contains the usual offices on the ground-floor, medical officers' room, library, secretary's office and board-room on the first-floor, and sitting and bedrooms for the staff are located on the second and third floors. The ward blocks are of three storeys each, containing eight wards, with accommodation for 180 beds. Each ward has the most approved sanitary service, in cross-ventilated semi-detached towers, consisting of patent water-closet apparatus, tip-up marble-topped lavatories, and porcelain baths, specially manufactured. The wards communicate with the central block by verandahs and bridges. They have fresh-air inlets and exhaust fans, and are heated by steam coils, with specially-adapted radiators. The operating block is of two stories, and contains an operating theatre, replete with the latest conveniences known to medical science, a theatre tastefully fitted up for convalescent patients, eight wards, and the very best sanitary appliances. There are also two blocks known as the Nightingale wing and the south wing, and the total number of beds is 280, with an air space of 1,700 cub. ft. each. The verandahs give 9,000 ft. of space for recreation, and the garden space is 25,000 super. ft. The Macquarie-street fronts are of freestone; the internal finishings are plaster and cement, ornamental zinc to the ceilings of the central and operating blocks, and Traegerwellblech iron to the ceilings of the wards. The architect for the completion was Mr. John Kirkpatrick, of Sydney.

MISCELLANEOUS.

CELTIC CROSS, BIDEFORD.—There has just been placed in the church cemetery at Bideford a Celtic cross to mark the spot where the remains of the late Mrs. C. C. Smith were interred. It has been designed by Sir Arthur W. Blomfield. The memorial has been carried out by Messrs. Harry Hems & Sons, of Exeter.

THE "PARADIGM" SKYLIGHT-SYSTEM.—The object of this skylight bar, made by the "Paradigm Construction Co.," is, apparently, to secure water-tight fitting by pressure by adjustable screws in the first instance, and in the second instance by such a section of the materials that no water which may find its way through the glass joints can get into the building. The glass (H in the section) is kept down on its bed under pressure by the brass bolt C, which is attached permanently to the cross-bar B, and has an adjusting screw at the top, over the capping. If any water does get between the glass and the capping, it can only run into the channel of the sash-bar. The initial cost of the method would probably be rather high, but it seems likely to last well.

A CIVIL WAR RELIC.—At the church of Teynham, Kent, an accident has led to a discovery which is of considerable interest. The west door has recently undergone a renovation, and the removal of all superficial covering has disclosed a very fine massive door in an admirable state of preservation. The most noticeable feature about the door is that it is scarred in several places with bullet marks. The white paint formerly concealed these marks from view. There is evidence in support of the theory that these bullets were fired into the door by some of Cromwell's soldiers when they were engaged in their work of spoliation and desecration of Kentish churches. In addition to the bullet holes, the surface of the door is charred in one or two places, giving the appearance of an ineffectual attempt to fire the door having once been made.

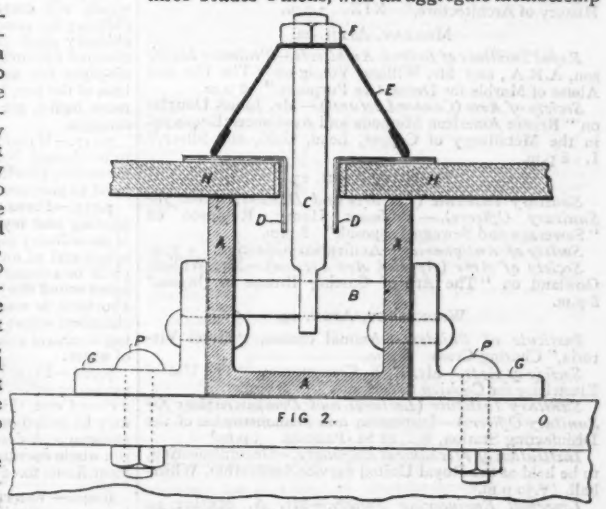
SOCIETY OF ANTIQUARIES OF SCOTLAND.—The usual monthly meeting of this Society was held on the 8th inst.—Mr. Reginald Macleod, vice-president, in the chair. In the first paper the Earl of Southesk gave a notice of the stone with an Ogham inscription recently found in digging a grave in the churchyard of Abernethy, Perthshire. In the second paper Mr. J. M. Mackinlay called attention to the *cultus* of St. Fillan, to be met with at Killallan, in Renfrewshire, and in the third paper Mr. Lockhart Bogle gave some archæological notes on Dunvegan Castle, the seat of the Chiefs of Macleod of Macleod in Skye. Mr. George F. Black, assistant keeper of the Museum, contributed a short note on a charmstone, a ball of rock crystal mounted in silver, with turquoise coloured settings and loops for suspension, which was exhibited by Colonel Eyles Gordon of Inverleny (through Mr. A. J. S. Brook, F.S.A.Scot.). Mr. W. Jenkinson Kaye, F.S.A.Scot., exhibited an interesting rubbing of the memorial brass of Sir Roger de Trumpington, in Trumpington Church, Cambridgeshire, dating from 1289.

WILLING'S NEWSPAPER PRESS GUIDE.—The twenty-second annual issue of "Willing's British and Irish Press Guide" is a concise and comprehensive index to the press of the United Kingdom. It contains, besides a list of the daily, weekly, and other newspapers, magazines, reviews, periodicals, annuals, &c., lists of the principal colonial and foreign journals, and a variety of other information. But we cannot understand why the name of the *Builder* is omitted under the heading "Architecture" in the classification section. Probably the compilers know nothing of the contents of this journal, and only know it by its name, and, therefore, think they have done sufficient in giving it under "Building"; but classification of this kind is of very little value. The same remarks apply to other journals. The main part of the work, however, is well arranged and seems to be reliable.

CAPITAL AND LABOUR.

THE LONDON BUILDING TRADE.—Great anxiety prevails in the London building trades concerning the result of the ballot which is now being taken among the men. The masters demand the insertion of the following conditions as a preamble to the working rules:—That no workman shall be placed under any disability by reason of being or not being a member of a trade society; that no objection shall be raised to sub-letting work provided these rules are observed. The federated unions are now voting upon the following questions:—(1) Are you in favour of accepting the above rules as additions to the present working rules? (2) Are you determined to stand by the working rules as agreed to in 1892? It is stated that in the event of the rules as set forth above not being accepted, there will be no agreement arrived at between the trades and employers.

STATE OF EMPLOYMENT IN MARCH.—The state of employment at the end of March showed a marked improvement compared with the end of February. In the building trades, shipbuilding, agriculture, and other outdoor industries, which were much affected in the early part of the year by the long spell of frost, there is now a good deal of work to be done, and employment in these trades shows considerable improvement. In the eighty-three Trades Unions, with an aggregate membership



The "Paradigm" Skylight Bar.

of 387,907 making returns, 25,146 (or 6·5 per cent.) are reported as unemployed at the end of March, compared with 7·9 per cent. in February, and 6·5 per cent. in the forty-five Unions making returns for March, 1894. The building trades have resumed active operations, and the percentage of unemployed in Unions making returns has fallen from 10·1 to 4·9, compared with 3·5 per cent. in March, 1894. Nearly all branches of the furnishing and woodworking trades have improved during the month, with the result that the percentage of unemployed has fallen from 7·0 to 4·7, which compares with 4·2 per cent. in the corresponding month of last year. Eleven disputes took place in the building trades

* That is to say, the jury includes a number of the first French architects of the day. Compare this with the way things go on at the Royal Academy, where often no architect at all is appointed on the Hanging Committee.

COMPETITION, CONTRACTS, AND PUBLIC APPOINTMENT.

COMPETITION.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered.
*System of Drainage	Woking U.D.C.	.....	May 8

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Alterations to Stockport-road Library and Public Hall	Manchester Corp.	T. de C. Meade	April 23
Cab Shelter and Convenience, Brook-street	do.	do.	do.
Pebbles for Repair of Roads	Northam U.D.C.	C. W. Hole	April 24
Joiner and other Work to New F. M. Church and Schools, Choppington		T. Tulip	do.
Street Works	Halifax High. Com.	E. R. S. Escott	do.
*Two Mangles	West Ham Union	*Official*	do.
*Alterations to Buildings		W. G. Stephenson	April 25
Hot-water Heating Apparatus, Wavertree	Liverpool Select Vestry		do.
Building Works, Wavertree	do.		do.
Iron Staircases, &c. Wavertree	do.		do.
Paving, &c. Streets, Gateshead	The Corporation	J. Bower	do.
Additions to Rothes Public School		A. W. Reid & Wittel (Elgin)	April 26
*Broken Granite	Walthamstow U.D.C.	G. W. Holmes	do.
*Painting Roof on North Side	Trustees of Borough Market	H. Jarvis & Son	do.
*Schools and Offices	Edgware School Board	*Official*	do.
Pulling-down and Rebuilding Chapel, Llwynypia	The Committee	Griffiths & Jones	April 27
Ten Houses, Shop, &c. Hills Town, Bolsover	Mr. S. Lichtenstein		do.
*Block of Buildings	Sheffield United Gas Light Co.	F. W. Stevenson	April 29
*Science and Art School	Folkestone Town C.	F. Newman	do.
*Gas Fittings	Finchley School Board	*Official*	do.
*Broken Granite and Flint	Hampton Wick U.D.C.	do.	April 30
*Underground Conveniences	Com. of Sewers (City of London)	do.	do.
Public Fountain, Pontypridd		C. B. Fowler	do.
*Making-up Roads	Tottenham U.D.C.	P. E. Murphy	do.
*House and Stable, Raleigh		J. Thompson	do.
*Additions at Workhouse	Mansfield Union	R. F. Vallance	May 1
Sea Wall and Esplanade at Lynmouth	Lynton U.D.C.	G. C. S. Richards	do.
Subway, near Stranton, West Hartlepool	N. E. R. Co.	W. J. Cudworth	do.
Public Hall, Pontycymmer		C. T. Evans	do.

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Broken Granite and Siftings	Sandwich Corp.	*Official*	May 1
*Seven Shops and Houses, Chiswick		F. & W. Stocker	do.
*Additions at the Western Hospital	Met. Asylum Board	A. & C. Harston	May 2
Distillery, &c. Works (Three Contracts), Kingussie			
*Deepening Well		A. Mackenzie	do.
600 yards Cast-Iron Mains, &c. Hebden	East Ashford Union	A. J. Burrows	May 3
*Road Works	Skipton R.D.C.	A. Rodwell	do.
Girls' School, &c.	Sevenoaks U.D.C.	J. Mann	May 4
School, Troedyrhiwfuwch, near Tredegar	Barry School Board	G. Thomas	do.
Extensions to Central Stores	Gelligaer School Board		May 6
*Painting Works at Schools, Sutton	Queensbury Indus. Society	John Drake	do.
*Painters' and Plumbers' Work	South Met. Sch. Dist.	*Official*	do.
*Engineers' Work	Com. of Sewers, City of London		May 7
*Carpenters' Work	do.	do.	do.
*Waterworks	do.	do.	do.
*Sewage Works	Kendal Corporation	G. F. Deacon	do.
*New Road and Sewer	Wellingboro' U.D.C.	G. & F. W. Hodson	do.
*Sanitary Fittings in Town Hall	Alleyn's College, Dulwich		do.
Sanitary Fittings in Conveniences, Philip's Park and Queen's Park	Manchester Corp.	J. Barry	May 8
Waterworks (Contract No. 1)	do.	T. de Courcy Meade	do.
*Rebuilding West Block at Workhouse	Consett Waterworks Co.	T. & C. Hawksley	do.
*Municipal Offices	Westminster Union	J. Waldram & Son	May 10
Extensions to Holy Trinity Church Schools, Twickenham	Gravesend Town Coun.	A. G. Smith	May 14
Shops, Newport, Mon.		H. A. Cheers	No date
Dwelling-House, Shop, Stable, &c. Throckley	Griffiths & Sons	W. H. Watling	do.
*Premises, Bristol	Mr. M. Henderson	W. Allen	do.
*Building Materials to Convict Prisons	Dorset Banking Co. Ltd.	G. M. Silley	do.
	Directors of Convict Prisons	*Official*	do.

PUBLIC APPOINTMENT.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Clerk of Works	Gillingham & Grange School Board	2*l.* 10s.	April 23

Those marked with an asterisk (*) are advertised in this Number. *Competition, p. xx.* *Contracts, pp. iv., vi., viii., and xx.* *Public Appointment, p. xviii.*

during the month, of which nine were due to wages questions, one to a question of unionism, and one was caused by an objection to piecework. Out of the 3,600 persons whose wages were increased, about 3,000 were engaged in the building trades.—*Labour Gazette.*

MEETINGS.

FRIDAY, APRIL 19.

Institution of Civil Engineers.—Students' visit to the Lion Brewery, 51, Belvedere-road, Lambeth, S.E. 2.30 p.m.

Sanitary Institute (*Lectures and Demonstrations for Sanitary Officers*).—Mr. W. C. Tyndale on "House Drainage." 8 p.m.

SATURDAY, APRIL 20.

Sanitary Institute (*Lectures and Demonstrations for Sanitary Officers*).—Inspection and Demonstration of the Barking Sewage Outfall Works.

Glasgow Architectural Association.—Visit to Stirling.

Queen's College, Cork.—Mr. Arthur Hill on "The History of Architecture." XIX. 3 p.m.

MONDAY, APRIL 22.

Royal Institute of British Architects.—Professor Aitchison, A.R.A., and Mr. William Young on "The Use and Abuse of Marble for Decorative Purposes." 8 p.m.

Society of Arts (*Cantor Lectures*).—Mr. James Douglas on "Recent American Methods and Appliances Employed in the Metallurgy of Copper, Lead, Gold, and Silver." I. 8 p.m.

TUESDAY, APRIL 23.

Sanitary Institute (*Lectures and Demonstrations for Sanitary Officers*).—Professor Henry Robinson on "Sewerage and Sewage Disposal." 8 p.m.

Society of Antiquaries.—Anniversary Meeting. 2 p.m.

Society of Arts (*Applied Art Section*).—Mr. William Gowland on "The Art of Casting Bronze in Japan." 8 p.m.

WEDNESDAY, APRIL 24.

Institute of Builders.—Annual dinner, "Hotel Victoria," Charing Cross. 6 p.m.

Society of Arts.—Mr. R. E. Crompton on "The Use of Electricity for Cooking and Heating." 8 p.m.

Sanitary Institute (*Lectures and Demonstrations for Sanitary Officers*).—Inspection and Demonstration of the Disinfecting Station, &c., at St. Pancras. 3 p.m.

Institution of Mechanical Engineers.—General meeting, to be held at the Royal United Service Institution, Whitehall. 7.30 p.m.

Liverpool Engineering Society.—Mr. A. Musker on "Artificial Paving Slabs." 8 p.m.

THURSDAY, APRIL 25.

Institution of Electrical Engineers.—Professor J. A. Ewing, M.A., F.R.S., on "A Magnetic Tester for Measuring Hysteresis in Sheet Iron." 8 p.m.

Civil and Mechanical Engineers' Society.—Mr. W. Cooper Penn on "Chain Making." 7. p.m.

Society of Arts (*Indian Section*).—Mr. J. W. Parry, A.M.Inst.C.E., on "The Coming Railways of India, and their Prospects." 4.30 p.m.

FRIDAY, APRIL 26.

Architectural Association.—Mr. C. W. Whall on "Painting, and its Relation to Architecture." 7.30 p.m.

Sanitary Institute (*Lectures and Demonstrations for Sanitary Officers*).—Mr. H. P. Boulnois on "Scavenging, Disposal of House Refuse." 8 p.m.

Institution of Civil Engineers (*Students' Meeting*).—Mr. Bernard Godfrey on "Brine Pumping." 8 p.m.

Institution of Mechanical Engineers.—General Meeting (continued). 7.30 p.m.

SATURDAY, APRIL 27.

Architectural Association.—Visit to St. Olave's Grammar School, Southwark (see advt.).

Sanitary Institute (*Lectures and Demonstrations for Sanitary Officers.*—Inspection and Demonstration of the Sewage and Destructor Works, Ealing. 2.15 p.m.

Edinburgh Architectural Association.—Visit to (1) Crichton Castle and Church; (2) to Borthwick Castle and Church.

Queen's College, Cork.—Mr. Arthur Hill on "The History of Architecture." XX. 3 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

4,815.—CHIMNEY TOPS: *G. Lavington and another.*—This patent relates to a chimney-pot or ventilating-cap which will create light up-currents of air within the chimney by means of openings constructed between the chimney stack and pot which communicates with nozzles directed upwardly inside the pot. To further assist this, air-pipes are extended down into the chimney from the base of the pot, having their ends turned upwards. One or more baffles are arranged in the top to prevent down-draught.

7,547.—WINDOWS: *W. Quelch.*—To enable the window to be cleaned from within, a loose pan is, according to this invention, provided, which turns on a hinge and allows the hand to gain acceess to the outside.

7,553.—PIPES: *E. Chrisfield.*—Refers to methods of jointing and laying drain and other pipes. In the socket of an ordinary pipe a soft tarred felt ring is placed, and the spigot end of another pipe is pressed against it. Liquid pitch or cement grout is then poured into the annular space round the joint, the pipes being in a vertical position. Provision is made for testing, &c., by placing inspection-chambers where the pipes change their direction and erecting a vertical column of pipes at the bend to contain a head of water.

7,982.—FIREPLACES: *W. Robb and others.*—To permit ranges or stoves to be used alternately with an open top or a closed one, this invention provides a movable flue which may be pulled out upon the hob or pushed back into the chimney. A doorplate and fire-cover is also provided, and the whole operated simultaneously by means of a pivotted lever-frame fixed to the hob.

8,040.—VENTILATORS: *A. Clifford.*—Consists of a louvre cap-ventilator, fitted at the top with an iron band, to which is hinged a metal flap, which opens outward and allows the cap to be cleaned.

8,365.—WINDOWS: *A. K. Downs.*—To enable the sashes to be opened into the room, the inner beads are put in with a tongue and groove so as to be readily removed to allow the sash, which may be pivotted on bolts at the bottom during the operation, to be pulled downwards into the room.

2,126.—WATER-CLOSETS: *T. Salter.*—To prevent splashing and soiling the back of the basin. For this purpose the back of the basin is made vertical and the opening to the water-seal is placed at the rear. The trap is framed by a sloping elbow-pipe into which the bottom of the pan fits.

2,652.—BRUSHES: *P. Lange.*—Provides a rotary brush for paper-hanging, mounted to rotate in a bow-shaped piece provided with a handle.

NEW APPLICATIONS FOR LETTERS PATENT.

APRIL 1.—6,631, W. Willis, Flushing Cisterns.—6,655, C. Allison, Rock Drill.—6,686, C. Bristow, Surveyor's Roadside Ruler.—6,696, G. King, Flanged Pipe Joints.

APRIL 2.—6,710, G. Smith, Glazing Roofs, Sashes, Skylights, &c.—6,716, W. Sinclair & C. Darrah, Syphon Flushing Cisterns for Water-closets, &c.—6,737, E. Delorenzi, Machine for making automatically Tiles, Paving of Cement.—6,775, E. Schuster, Sharpener for Edge-tools.—6,793, P. R. Jackson & Co., Limited, F. Lewis, and G. Kemp, Treating Wood-pavement.

APRIL 3.—6,807, W. Everard, Sash-Fasteners.—6,809, A. Nicholls and A. Boiston, Invisible Door-springs and Checks.—6,825, F. Daw, Fastener for Windows, Doors, &c.—6,830, J. Stanley, Window-sash Fastener.—6,842, W. Howell, Band Saw Guides.—6,860, R. & J. Irving, Gates, Doors, &c.—6,866, P. Stolte, Building Slabs or Blocks.—6,874, C. & F. Hutchinson, Securing Sliding Window-sashes in various positions, &c.

APRIL 4.—6,933, A. Dykes and W. Handcock, Water-pipes.—6,954, S. Newman, Preventing the Bursting of Water Mains through Frost.—6,968, E. Abbott, Casements.

APRIL 5.—H. Lardner, Gate-fastenings.—7,007, S. Hawkins, Frames for Upholstery.—7,008, W. Parry, jun., Catch for Doors, Gates, &c.—7,019, J. Holden, Revolving Tools or Cutters for Grooving Wood.

APRIL 6.—7,055, A. Fisher, Window-fastener.—7,061, A. Brown and H. Pruce, Connecting Door and other Knobs to their Spindles.—7,078, T. Rimmer, Mitre Cutting Machine.—7,081, A. Bantock, Back Flush Gulley.—7,097 and 7,098, W. Youlten, Casements.—7,106, J., T., and J. Cloughton, Stair-treads and other Floor Surfaces.

PROVISIONAL SPECIFICATIONS ACCEPTED.

4,711, F. Perkins, Hand-planes.—4,732, J. Pearson, Blue Bricks, &c.—4,781, J. Welby, Window-sashes.—4,973, L. Jones, Fireclay.—4,993, S. Ferry, Domestic and other Fire-grates.—5,111, G. Stevens, Indicating and Localising Stoppages by Frost in Water-pipes, and to Prevent Pipes from Bursting, and to Avoid Explosions in Kitchen Boilers.—5,298, J. Sandall, Band Saw-guide.—5,724, H. Weyhe, Hollow Blocks or Slabs for Building Purposes.—5,931, H. Curtis, Water-supply Pipes, &c.—6,179, H. Mossner, Floors and Ceilings.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

6,904, F. Trier, Machinery for Working Stone.—9,517, M. Tibbets, Draught Creator and Gas-lamp Combined for Ventilating Sewer-shafts.—10,086, J. Hamilton, Composition of Bricks, &c.—10,521, A. Gonsaloes, Fastenings for Cabin and Other Doors or Windows.—10,713, C. Dean and J. Hetherington, Kilns.—13,116, J. Gordon, Making Glazed Bricks, Tiles, &c.—16,302. W. Ebel, Wall Decoration.—324, J. Foster, Kilns.—3,778, F. Koerfer and others, Device for Opening and Closing Sky-lights or Fan-lights.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

APRIL 5.—By *John Davies:* 7 and 9, Riversdale-rd., Highbury, u.t. 75 yrs., g.r. 10*l.*, r. 76*l.*, 680*l.*; 58, Tollington-rd., Holloway, u.t. 54 yrs., g.r. 6*l.* 5s., 340*l.*; 38, Cantlowes-rd., Camden-sq., u.t. 68 yrs., g.r. 9*l.*, r. 38*l.*, 360; 19, Elm-grove, Cricklewood, u.t. 84 yrs., g.r. 2*l.* 18s., r. 29*l.*, 270*l.*; 30, Vardens-rd., Wandsworth, f., r. 45*l.*, 540*l.*; 2 and 5, Brookdale-rd., Catford, f., r. 51*l.*, 600*l.*—By *Reynolds & Eason:* 143 and 145, Great Cambridge-st., Hackney, f. 1,110*l.*; 6 to 30 even, Angrave-st., Haggerston, u.t. 61 yrs., g.r. 78*l.*, 255*l.*; 67 and 69, Angrave-st.,

u.t. 44 yrs., g.r. 9*l.*, 475*l.*; 39, Liberia-rd., Highbury, u.t. 90 yrs., g.r. 7*l.*, r. 38*l.*, 425*l.*; 27, Cheyne-walk, Chelsea, u.t. 66 yrs., g.r. 2*l.*, r. 125*l.*, 1,575*l.*; 30, Cheyne-walk, u.t. 66 yrs., g.r. 2*l.*, r. 118*l.*, 1,355*l.*; 41 and 43, Oakley-st., u.t. 70 yrs., g.r. 15*l.*, r. 145*l.*, 1,695*l.*; 67, Oakley-st., u.t. 66 yrs., g.r. 6*l.*, r. 75*l.*, 765*l.*; 71, Oakley-st., u.t. 66 yrs., g.r. 4*l.*, r. 75*l.*, 865*l.*—By *G. J. Smith*: 115 and 117, Mansfield-rd., Kentish Town, u.t. 57 yrs., g.r. 13*l.* 10s., r. 76*l.*, 580*l.*; 53, Hungerford-rd., Camden-rd., u.t. 65 yrs., g.r. 2*l.*, r. 45*l.*, 495*l.*; 51, 53, and 55, Prince of Wales-rd., Kentish Town, u.t. 65 yrs., g.r. 7*l.*, r. 76*l.*, 545*l.*; 145, Gloucester-rd., Regent's-pk., u.t. 56 yrs., g.r. 8*l.* 8s., r. 48*l.*, 380*l.*; 26, Chalcot-cres., u.t. 41 yrs., g.r. 8*l.*, r. 42*l.*, 305*l.*; i.g.r. of 50*l.*, Berkeley-rd., u.t. 51 yrs., g.r. 18*l.*, 635*l.*; 174 and 176, Regent's-pk.-rd., u.t. 51 yrs., g.r. 16*l.*, r. 120*l.*, 940*l.*; 186, Regent's-pk.-rd., u.t. 51 yrs., g.r. 8*l.*, 375*l.*; 190, Regent's-pk.-rd., u.t. 51 yrs., g.r. 8*l.*, r. 46*l.*, 400*l.*

APRIL 8.—By *Slade & Butler*: 20 to 28 (even), St. Mary's-rd., Barking, u.t. 90 yrs., g.r. 13*l.* 15s., 300*l.*; 30 to 54 (even), St. Mary's-rd., u.t. 92 yrs., g.r. 35*l.* 15s., 870*l.*; 138A, St. John's-rd., Holloway, and 59A, St. Nicholay-rd., u.t. 83 yrs., g.r. 15*l.*, 325*l.*; 31, Highbury-quadrant, Highbury, u.t. 54 yrs., g.r. 17*l.* 17s., r. 125*l.*, 700*l.*; 4 and 6, Templar-rd., Hackney, u.t. 66 yrs., g.r. 14*l.*, 180*l.*—By *Wootton & Green*: 129, Mallinson-rd., Clapham, u.t. 86 yrs., g.r. 6*l.* 10s., 280*l.*—By *Ramsey & Co.*: 498, Old Ford-rd., Old Ford, f., r. 26*l.*, 350*l.*; 6, 8, and 16, Bankton-rd., Brixton, u.t. 79 yrs., g.r. 18*l.* 18s., r. 93*l.* 7s., 735*l.*; 28, Brunswick-sq., Camberwell, u.t. 43 yrs., g.r. 10*l.*, garden rate, 2*l.* 2s., 300*l.*

[*Contractions used in these Lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.

Greenheart, B.G.	ton	8/0/0 — 0/0/0
Teak, E.I.	load	10/0/0 — 16/0/0
Sequoia, U.S. ft. cu		1/10 — 2/2
Ash, Canada load		2/15/0 — 4/0/0
Birch, do.		2/15/0 — 4/0/0
Elm, do.		3/10/0 — 4/15/0
Fir, Dantsic, &c.		1/15/0 — 3/10/0
Oak, do.		2/15/0 — 4/15/0
Canada		5/10/0 — 7/0/0
Pine, Canada red		2/15/0 — 3/5/0
Do. Yellow		3/5/0 — 5/10/0
Lath, Dantsic, fath		4/10/0 — 5/10/0
St. Petersburg		5/0/0 — 6/10/0
Wainscot, Riga, &c., log		3/0/0 — 5/5/0
Odessa, crown		3/0/0 — 5/5/0
Deals, Finland		
2nd & 1st std 100		7/0/0 — 8/10/0
Do. 4th & 3rd		7/0/0 — 8/0/0
Do. Riga		7/0/0 — 8/0/0
St. Petersburg, 1st yellow		9/10/0 — 12/0/0
Do. 2nd yellow		7/10/0 — 9/0/0
Do. white		8/0/0 — 9/10/0
Swedish		7/0/0 — 15/10/0
White Sea		7/10/0 — 15/0/0
Canada, Pine 1st		21/0/0 — 24/10/0
Do. do. 2nd		16/10/0 — 17/10/0
Do. do. 3rd, &c.		8/0/0 — 10/5/0
Do. Spruce, 1st		8/10/0 — 10/0/0
Do. do. 3rd and 2nd		6/10/0 — 7/5/0
New Brunswick		6/0/0 — 7/0/0
Battens, all kinds		5/0/0 — 21/0/0
Flooring boards, sq., 1 in. prep. 1st		0/9/0 — 0/14/0
Do. 2nd		0/6/6 — 0/11/0
Other qualities—		0/4/6 — 0/7/0
Cedar, Cuba	ft.	/3 — /4
Honduras, &c.		/3 — /4½
Mahogany, Cuba		/3½ — /6
St. Domingo, cargo av.		/3½ — 1/0
Mexican do. do.		/3 — /4
Tobasco do. do.		/3½ — /6
Honduras do.		/3½ — /5½
Box, Turkey	ton	4/0/0 — 15/0/0
Rose, Rio		7/0/0 — 16/0/0
Bahia		6/0/0 — 15/0/0
Satin, St. Domingo		0/0/5 — 0/1/0
Satin, Porto Rico		0/0/6 — 0/1/6
Walnut, Italian		0/0/3½ — 0/0/7

METALS.

Iron—Pig, in Scotland	ton	2/2/5 — 0/0/0
Bar, Welsh, in London		5/12/6 — 5/15/0
Do. do. at works in Wales		5/2/6 — 5/5/0
Do. Staffordshire, in London		6/0/0 — 6/10/0
COPPER—British cake and ingot		42/15/0 — 43/5/0
Best selected		43/5/0 — 43/15/0
Sheets, strong		50/0/0 — 0/0/0
Chili bars		40/5/0 — 40/10/0
YELLOWM'TALb		0/0/4 — 0/0/4½
LEAD—Pig, Spanish	ton	12/0/0 — 0/0/0
English com. brands		10/2/6 — 10/3/9
Sheet, English, 6 lbs. per sq. ft. and upwards		10/15/0 — 11/0/0
Pipe		11/15/0 — 0/0/0
ZINC—English sheet	ton	18/10/0 — 19/0/0
Vieille Montagne		19/10/0 — 0/0/0
TIN—Straits		64/5/0 — 65/7/6
Australian		64/17/6 — 65/7/6
English Ingots		68/0/0 — 68/10/0
Banca		65/0/0 — 65/5/0
Billiton		64/15/0 — 65/0/0

OILS.

Linseed	ton	19/12/6 — 20/0/0
Cocoanut, Cochin		25/0/0 — 25/0/0
Do. Ceylon		23/0/0 — 0/0/0
Palm, Lagos		23/10/0 — 0/0/0
Rapeseed, English pale		22/10/0 — 0/0/0
Do. brown		21/0/0 — 0/0/0
Cottonseed ref.		17/15/0 — 18/15/0
Oleine		19/10/0 — 21/10/0
Lubricating, U.S.		4/0/0 — 5/0/0
Do. refined		5/0/0 — 12/0/0
TAR—Stockholm	barrel	1/1/0 — 1/1/6
Archangel		0/15/6 — 0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays.*]

ABERDARE.—For the construction of a new road 740 yards in length, from the Nanthir reservoir, for the Urban District Council:—

Barnes & Chaplin	£380	0	0
James Hek	376	8	3
Batchelor & Snowdon	346	0	0
Lloyd & Rowell, Pontypridd*	£314	10	0

*Accepted.

ABERDEEN.—For the construction of sewers, Fountain Hall road and Beaconsfield-place, for the Town Council. Mr. Geo. T. Lynam, Assistant Burgh Surveyor, Town House, Aberdeen:—

Gall & Walker, Richmond-street £377

ABERGAVENNY.—For the construction of gasholder, &c., for the Urban District Council. Mr. S. Cross, engineer, Gasworks, Abergavenny:—

Gasholder and Tank.—Clayton, Son, & Co., Leeds £2,270
Exhauster and Steam-engine.—J. F. Blakeley & Co., Ravensthorpe 194
Governor and Connexion.—J. Coates & Co., London 89
Two Boilers.—George Davies, Abergavenny 160

ABERTILLERY (Mon.).—For the erection of school buildings, Queen-street, for the Aberystruth School Board. Mr. Geo. Rosser, architect, Victoria-buildings, Abercarn. Quantities by the architect:—

D. Davies	£6,055	D. C. Jones & Son	£5,348
D. Jenkins	5,950	G. H. Wilkins	5,240
John Linton	5,700	John Jenkins	4,915
C. F. Morgan	5,696	A. P. Williams, Abertillery, Mon. (accepted)	4,842
Hatherley & Carr	5,395		
Williams & Rogers	5,376		

AYLESBURY.—Accepted, at a schedule of prices, for the supply of about 16,500 tons broken granite, for the Bucks County Council. Mr. R. J. Thomas, County Surveyor, Exchange-buildings, Aylesbury:—

	Tons.
Groby Granite Co., Groby, Leicester	5,500
Ireland & Knight, Mancetter, Atherstone	3,500
I. J. Large (Griff Co.), Leighton Buzzard	1,700
Enderley Granite Co., Narborough	1,200
Clee Hill Granite Co., Ludlow, Salop	1,200
Field & Mackay, Tilterstone Quarries, Salop	1,200
J. G. Bull & Co. (Clee Hill Dhu), 16, South Wharf, Paddington	1,200
G. Cannon (Mountsorrel), High-street, Aylesbury	600

BARNSLEY (Yorks.).—For the erection of Salvation Army premises, Wellington-street, for the Barnsley Citadel Company, Limited. Mr. A. Gordon, architect, 101, Queen Victoria-street, London, E.C.:—

Jas. K. Taylor	£1,991	0	
J. J. Smith & Co.	1,849	0	
A. Clough	1,792	0	
E. Gilder	1,720	0	
Thos. Morgan	1,585	0	
Rhodes Bros.	£1,562	0	
H. Burrows & Son	1,507	5	
H. & F. Turton, Stairfoot, Barnsley*	1,480	0	

* Accepted.

BARNSLEY.—Accepted for the construction of sewers (2,150 yds.), &c., for the Ardsley Urban District Council, near Barnsley. Mr. T. S. McCallum, C.E., 4, Chapel Walks, Manchester:—

Contract No. 1.—Sewage Purification Works.
H. & F. Turton, Stairfoot, near Barnsley £1,479
Contract No. 2.—Sewers.
Duncan & Jones, Stairfoot, near Barnsley £2,150

BOURNEMOUTH.—Accepted for making new roads, &c., on the Victoria Park Estate, for Mr. H. Joy. Messrs. Jennings & Goater, architects and surveyors, Bournemouth:—

S. Saunders £126 10

BOWES PARK.—Accepted for alterations to Bowes Park Manor, for the Guardians, Parish of St. Mary, Islington. Mr. Wm. Smith, architect:—

C. Peek, Harringay, N. £939

BRIDGNORTH.—For the erection of the Bridgnorth and South Shropshire Infirmary. Mr. E. C. H. Maidman, architect, Edinburgh. Quantities by Mr. W. E. Davis, Falcon-court, 32, Fleet-street:—

		Brierley Hill Facings.	Edwards' Ruabon Facings.
George Cave	£5,927 0 0	£150 0 0	£137 0 0
Henry Gough	5,770 0 0	143 0 0	128 0 0
J. Jones & Son	5,700 0 0	300 0 0	300 0 0
H. Willcock & Co.	5,641 0 0	61 10 0	123 0 0
Treasure & Son	5,535 0 0	29 0 0	137 0 0
R. Bowen	5,460 10 0	32 0 0	54 0 0
Bickerton & Maddocks	5,300 0 0	32 0 0	127 0 0
William Bate	5,129 0 0	41 0 0	117 17 6
R. Thompson	5,100 0 0	120 0 0	235 0 0
A. Roper	5,082 0 0	99 15 0	121 12 0
J. Guest & Son	4,540 0 0	147 0 0	147 0 0
R. Merton Hughes, Birmingham*	4,271 0 0	65 0 0	97 0 0

*Accepted.

CHEARSLEY (near Thame).—Accepted for the erection of house, with stables, for Mr. E. H. Vincent. Mr. W. F. Taylor, architect:—

G. H. Gibson, High Wycombe £1,830

COWES (I.W.).—For the erection of buildings, for the West Cowes Steam Laundry Co. Mr. S. E. Tomkins, architect:—

H. C. Day	£1,212	0	
Barton Bros.	1,158	10	
Tarrant	1,137	0	
Thomas	£1,097	0	
Meader	1,024	0	
Ball & Son (accepted)	1,089	0	

[The machinery and fittings will be supplied and fixed by Messrs. Manlove, Alliot, & Co., Ltd., of London.]

CREWE.—For the execution of road-works, Bradfield-street and others, for the Town Council. Mr. G. Eaton Shore, Borough Surveyor, Municipal Offices, Earle-street, Crewe:—

A. & H. Hulse, Winsford	£7,428 17 10
Fredk. Lunt, Crewe	7,205 8 11
H. Chesters, Crewe	5,533 8 7
Fredk. L. Bennie, Warrington*	4,191 4 2
Fredk. Barke, Stoke-on-Trent*	952 17 0

* The contract was divided between these contractors in the amounts named.

FACIT (Lancs.).—Accepted at a schedule of prices for the supply of road materials, for the Whitworth Urban District Council. Mr. Rodley, surveyor. Facit:—

Brundrit & Co., Penmaenmawr	Welsh Granite
Darbishires, Limited, Penmaenmawr	Welsh Granite
Parker & Sanderson, Cown Whitworth Quarries	Local Stone, Flags, Setts, &c.
John Dyer, Shawforth in Rochdale	Flagging, Paving, &c.

FOLKESTONE.—For the supply of 2,000 yards York-stone flagging, for the Corporation. Mr. John White, Borough Engineer, Folkestone:—

	At per yard sup. s.	d.		At per yard sup. s.	d.
Illingworth & Sons	7	4	L. Sommerfelt	6	0
J. & W. Wyld	7	1	T. Milnes & Coy	5	10
F. Webster & Co.	7	1	Cooper Bros.	5	9
Walton Bros.	6	8	A. & F. Manuelle	5	8½
Nowell & Robson	6	5	J. Farrar & Sons	5	8
S. Trickett & Sons	6	5	W. Griffiths, Kingsland-road, London*	5	8
Pawson Bros.	6	2			
W. Horsfall Vint	6	2			

* Accepted.

HAMPTON-ON-THAMES.—Accepted for the supply of road materials, for the Urban District Council. Mr. John Kemp, surveyor, Park House, Hampton-on-Thames:—

Per ton.
R. L. & J. Fenning, London ..... 12 9 Guernsey granite.
Per yard.
Wills & Packham, Sittingbourne ..... 6 6 Kentish chalk flints.
John Light, Hampton Hill ..... 3 9 Local stone and gravel for footways.

HIGHAM FERRERS (Northants).—For the erection of stores and manager's house, for the Co-operative Society. Mr. H. Adnitt, architect, Harborough-road, Rushden. Quantities by the architect:—

T. Wilmott, jun.	£960	W. T. Whitbread	£912
Whittington & Tomlin	950	F. Henson	895
C. Bayes & Son	942	F. Johnson & Son	893
H. C. Berrill	925	Hacksley Bros.	855
R. Marriott, jun.	920	H. Sparrow, Rushden*	850
T. Swindall	920		

* Accepted.

HINCKLEY (Leics.).—For the erection of additions to factory, for Messrs. Murcott & Goode. Messrs. Redfern & Haigh, architects, 26, Millstone-lane, Leicester. Quantities by the architects:—

S. & E. Bentley	£3,785	A. Jeffcote	£3,460
J. Gettim	3,734	Greaves & Farmer	3,365
J. Wilson	3,658	G. Hewitt	3,318
A. Wincott	3,529	Moss & Son, Loughborough (accepted)	3,265
T. B. Woodward	3,495		

HOVE (Sussex).—For the construction of a sewer, Lower Market-street, for the Urban District Council. Mr. H. H. Scott, Town Surveyor, Town Hall, Hove:—

Messrs. J. Parsons & Sons, Church-road, Hove £159

LLANBRADACH (Wales).—For forming roads, sewers, &c., on the Coed-y-Brain, for Captain De Winton. Mr. C. Telford Evans, architect, 14, Queen-street, Cardiff:—

Jones & Thornley	£1,252	15	6
Thos. Rees	1,200	0	0
B. Evans	939	8	3
Thos. Harris	913	5	5
H. Knill	897	6	8
T. W. Davies	776	14	3
R. I. Mathias	£770	13	6
E. H. Page	755	15	7
Barnes, Chaplin, & Co., Cardiff*	720	14	7
John Mackay	720	10	0

* Accepted.

LONDON.—Accepted for new stables, Victoria-road, Stroudgreen. Mr. Horace T. Bonner, architect:—

C. Peek, Harringay £279

LONDON.—For alterations to the "Baker's Arms" Public-house, Warner-place, Hackney-road, E., for Mr. Joseph Pryor. Mr. Joseph G. Needham, architect:—

Pewtering.—W. Paddon, jun.	£48
Gasfitting.—J. Steadman	38
E. Lancaster (accepted)	328

LONDON.—For alterations and repairs to No. 29, Osborn-street, Brick-lane, E., for Mr. T. Kendon. Mr. Joseph G. Needham, architect, 11, Powersoroft-road, Clapton:—

H. Wendon	£470	W. Wells	£355
Coulsell Bros.	383	H. Hood	344
J. Cooper	369	E. Lancaster (accepted)	338

[Architect's estimate, £340.]

LONDON.—For making-up and paving in the parish of Fulham, for the Vestry of Fulham. Mr. Charles Botterill, Engineer and Surveyor:—

	Shottendane-road.—Section 1. Roadway	Yorkstone	Patent Adamant Stone	Victoria Stone	Imperial Stone	Asphalting* £ s. d.
E. Rogers	273	198	—	—	156	69 0 0
G. Wimpey	257	195	141	—	—	—
H. Greenham	249	—	—	—	—	—
J. Mears	260	—	—	—	—	—
French Asphalte Co.	—	—	—	—	—	52 11 12
Nowell & Robson	266	199	—	—	—	—
Victoria Stone Co.	—	—	—	156	—	—
Imperial Stone Co.	—	—	—	—	152	—
Val de Travers Asphalte Co.	—	—	—	—	—	55 0 0

* Passage between Dawes-road and Pellant-road.

LONDON.—Accepted for new laundry buildings, Workhouse, Cornwallis-road, Holloway, for the Guardians, Parish of St. Mary, Islington. Mr. Wm. Smith, architect:

C. Peek, Harringay £2,839

LONDON.—Accepted for extension of two shops, 45 and 47, Stroud Green-road. Mr. Wm. Smith, architect:—

C. Peek, Harringay £322 10 0

LONDON.—Accepted for alterations to 39, High-street, Islington. Mr. Percy B. Tubbs, architect:—

C. Peek, Harringay £139

LONDON.—Accepted for new club house, Finchley Golf Club. Mr. Percy B. Tubbs, architect:—

C. Peek, Harringay £215

LONDON.—For building two cottages, Derbyshire-street, Bethnal Green, E., for Mr. E. Kendon. Mr. Joseph G. Needham, architect, 11, Powerscroft-road, Clapton, N.E.:—

W. Walker	£497	Coulsell Bros.	£459
J. Bane	492	H. Hood (accepted)	395
E. Lancaster	490		

[Architect's estimate, £450.]

LONDON.—Accepted for erecting two houses, Hewitt-road, Hornsey. Mr. C. Waters, architect:—

C. Peek, Harringay £800

LONDON.—For additions to No. 1, Benwell-road, Holloway, for Mr. Frank Bailey. Mr. Edmd. J. Harrison, architect, 12, Compton-terrace, Highbury:—

J. R. Cordell	£293	12	
Ward & Lamble	283	0	
Wilkinson Bros., Finsbury Park (accepted)	£272	10	

LONDON.—For shop fronts and fittings to Nos. 82 and 84, High-street, Clapham, for Mr. A. C. Harrold. Mr. Edmd. J. Harrison, architect, 12, Compton-terrace, Highbury:—

Geo. Colls	£662	0	0
Robt. Eddie	573	0	0
Wm. Salter	539	3	10
J. Mowatt	£498	0	0
Lyne & Smith, Farringdon-street*	487	0	0

*Accepted.

LONDON.—For new shop-front and fittings to No. 22, Upper-street, N., for Mr. L. Jacobs. Mr. Edmd. J. Harrison, architect, 12, Compton-terrace, Highbury:—

Ward & Lamble	£417	0	
Ed. Small	397	0	
Drew & Cadman	374	0	
Robt. Eddie	£335	10	
Geo. Colls, Brunswick-place, N. (accepted)	330	0	

LONDON.—Accepted for shop fittings to Nos. 13 and 14, Topsfield-parade, Crouch End, N., for Messrs. Shears Bros. Mr. Edmd. J. Harrison, architect, 12, Compton-terrace, Highbury:—

W. H. Clarke, Croydon £235

NEEDHAM.—For erecting the Needham schools, for the Barking School Board. Mr. John Shewell Corder, architect, Wimbourne House, Ipswich. Quantities by Mr. Walker, London:—

Rice	£3,700	0	0
Grayston	3,575	0	0
Death	3,498	18	6
West	3,495	0	0
Parkington	3,483	0	0
Bennett	3,465	0	0
Girling & Coe	£3,445	0	0
Youngs	3,318	0	0
Gibbons	3,280	0	0
Chapman	2,943	16	0
Theobald, Needham*	2,861	0	0

* Accepted.

RUSHDEN (Northants.).—For the erection of four houses Rock-road, for Mr. E. Wooding. Mr. H. Adnitt, architect, Harborough-road, Rushden. Quantities by the architect:—

H. Sparrow	£800	F. Henson	£760
T. Wilmott, jun.	809	T. Swindall, Rushden (accepted)	740
R. Marriott, jun.	785	H. C. Berrill (withdrawn)	723
W. T. Whitbread	779		
Hacksley, Bros.	773		

RUSHDEN (Northants).—For the erection of general stores, bakery, stables, manager's house, &c., Wellingborough-road, for the Rushden Industrial Co-operative Society. Mr. H. Adnitt, architect, Harboro'-rd., Rushden. Quantities by the architect:—

Hacksley Bros.	£2,185	0	
R. Marriott, jun.	2,015	0	
W. T. Whitbread	2,000	7	
H. Sparrow	1,950	0	
F. Johnson & Son	1,930	0	
C. Bayes & Son	1,919	0	
T. Swindall	£1,877	0	
T. & C. Berrill	1,875	0	
Whittington & Tomlin	1,869	0	
T. Wilmott, jun., Rushden (accepted)	1,825	0	

RUTHERGLEN (N.B.).—For the supply of road-metal, &c., for the Commissioners. Mr. S. M'Bride, Burgh Surveyor, Town Hall Buildings, Rutherglen:—

Maintenance of Highways.

Robert Kerr, Eastfield, Rutherglen*—

	s.	d.	
Metal, per cubic yard	5	8	
Ashes, per cart	0	4	
Horse, per hour	0	10	Lifting mud of streets
Horse, per hour	0	9	Watering streets

Henderson & Sons—

Metal, per cubic yard	5	9	
Ashes, per cart	0	6	
Horse, per hour	0	10	Lifting mud of streets
Horse, per hour	0	9	Watering streets

Cleansing Contract, Ashpits, &c.

J. Crawford	£500	David Kerr, junr., Goose-berry Hall*	£45
Alex. Vallance & Son	479		

* Accepted.

SELBY.—For the construction of 1,472 yds. pipe sewers, &c., for the Urban District Council. Mr. W. Curry, Surveyor, Town Hall, Selby:—

Wilks & Ross	£1,489 9 2	R. Wood	£744 13 0
Thos. Bell	1,166 13 0	A. H. Atkinson	716 4 0
Hu l	943 19 8	John Nelson, York*	689 19 6
W. Doleman	885 15 2	* Accepted.	

SOUTHEND-ON-SEA.—For the erection of pavilion, administration block and out-buildings (Sanatorium). Mr. W. Y. Hobbiss, architect, Clarence-road, Southend. Quantities by Mr. F. W. Harrison:—

White & Son	£3,500 0	F. Smith	£3,149 0
C. North	3,464 0	H. J. Carter	3,041 0
Calnan & Co.	3,381 0	J. Brown	2,930 0
E. West	3,295 0	Baker & Wiseman, Tyler's-avenue, Southend-on-Sea*	2,853 13
Davis & Leaney	3,220 0		
Girling & Coe	3,198 0		
J. W. Steward	3,156 0	* Accepted.	

STROUD.—For the erection of school buildings, Inchbrook, near Nailsworth. Mr. M. H. Medland, architect, Gloucester:—

Drew Bros.	£783	Cox & Son, Nailsworth*	£744
S. Cox	770	* Accepted.	

WALTHAM CROSS.—Accepted for erecting house at sewage farm, Waltham Cross, for the Cheshunt Urban District Council. Mr. S. Towlson, A.M.Inst C.E., architect:—

Walter Lawrence. Waltham Abbey (lowest of three tenders received) £298 10

WALTHAMSTOW.—For alterations to the "Rising Sun" Public-house, New-road, Walthamstow, Essex, E., for Mr. Frank Parish. Mr. Joseph G. Needham, architect, 11, Powerscroft-road, Clapton, N.E.:—

E. Lancaster	£265 10	Taperell & Davis*	£248 0

Pewtering.

R. Pring'e	£110 0	W. Rogers & Son*	£78 10
W. Paddon, jun.	83 0		

* Accepted.

WHITCHURCH (Shropshire).—Accepted for alterations and additions at Morley House, Watergate, Whitchurch, Shropshire. Mr. Frank E. Smee, architect and surveyor:—

John Corfield, Whitchurch £178

WREXHAM.—For the erection of stabling, surgery, &c., Egerton House, for Mr. Richard Williams. Mr. J. H. Swainson, architect, 31, High-street, Wrexham. Quantities by architect:—

	Stable.	Surgery.
W. E. Samuel	£741 0 0	£325 0 0
Wm. Rogers	757 12 0	322 17 6
Turner Bros.	842 10 9	273 14 8
Davies Bros., Hill-street*	757 2 6	279 19 9

* Accepted, subject to reductions.
[Architect's estimate, £1,047 10s.]

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B. S.—R. W.—J. A. (amounts should have been stated).—W. H. T.—A. C. T. (below our limit).—R. J. (the article you enquire about was in our issue for December 31, 1892).—J. E. P. (too late: next week).

We are compelled to decline pointing out books and giving addresses.

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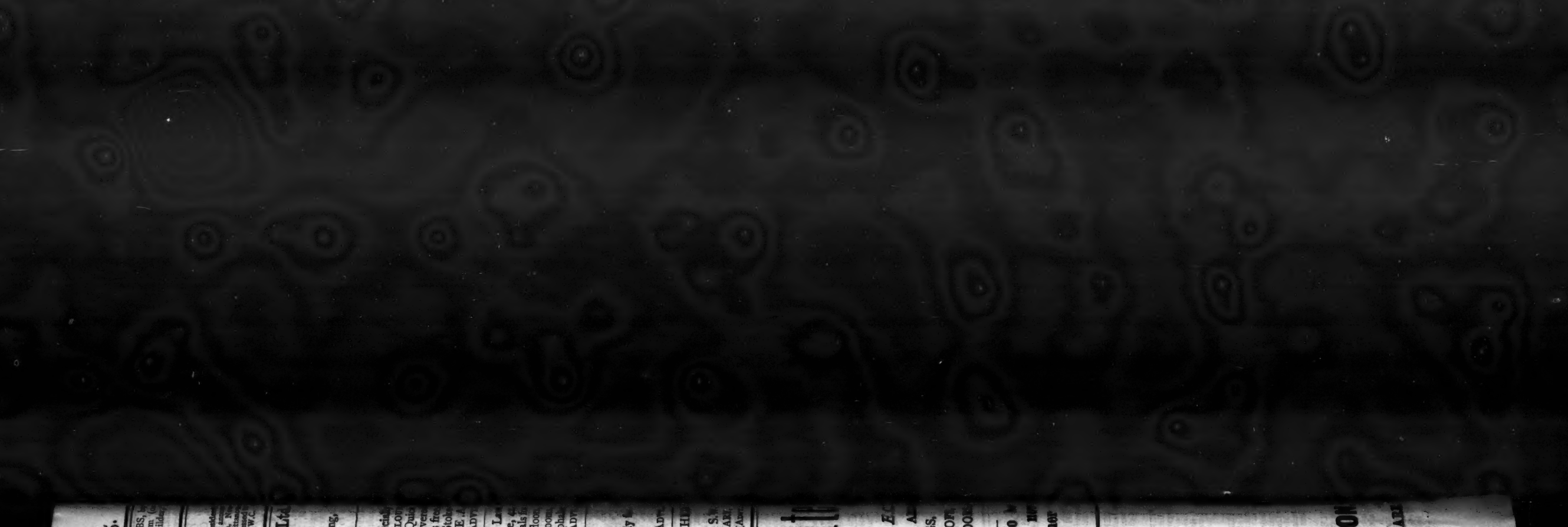

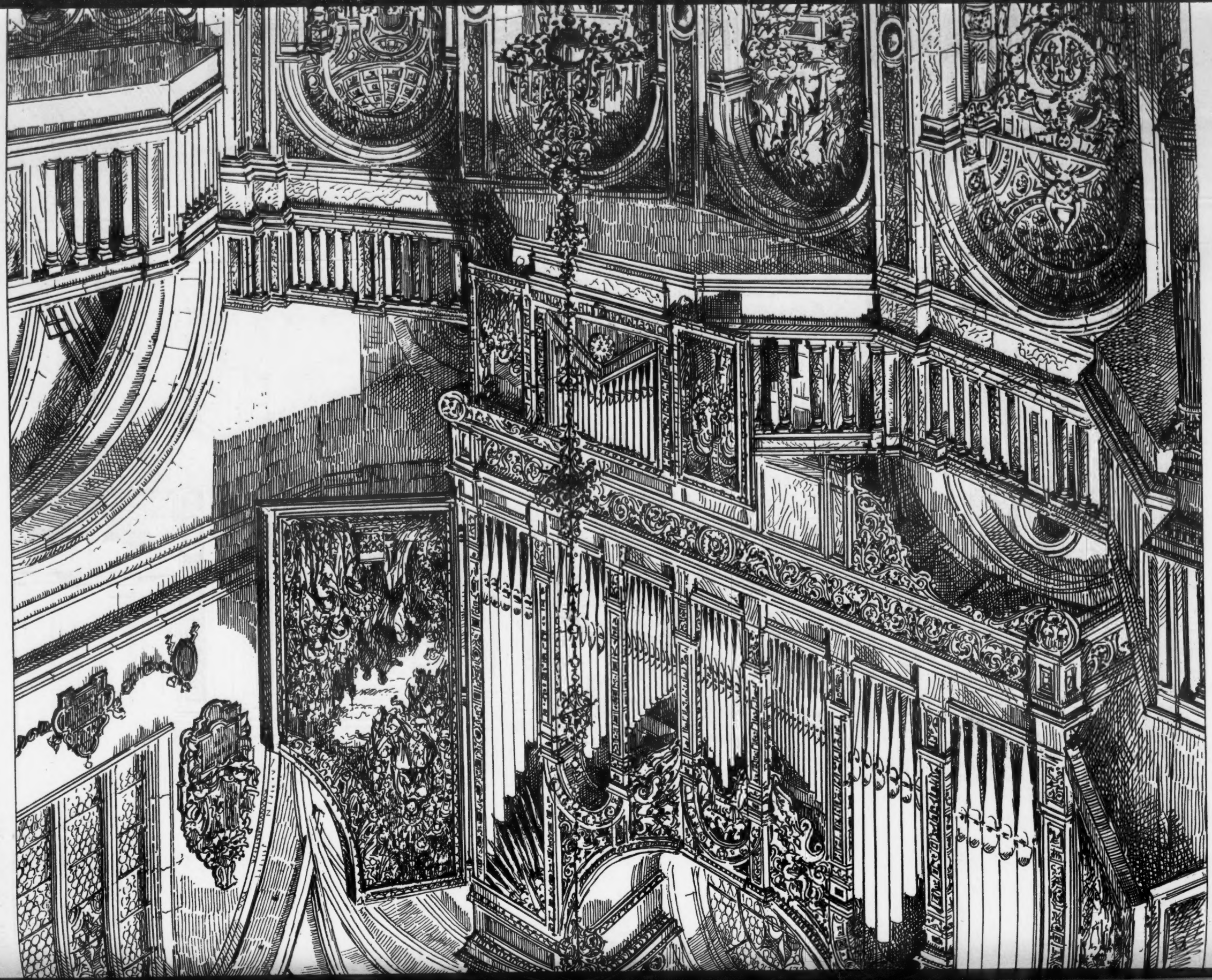

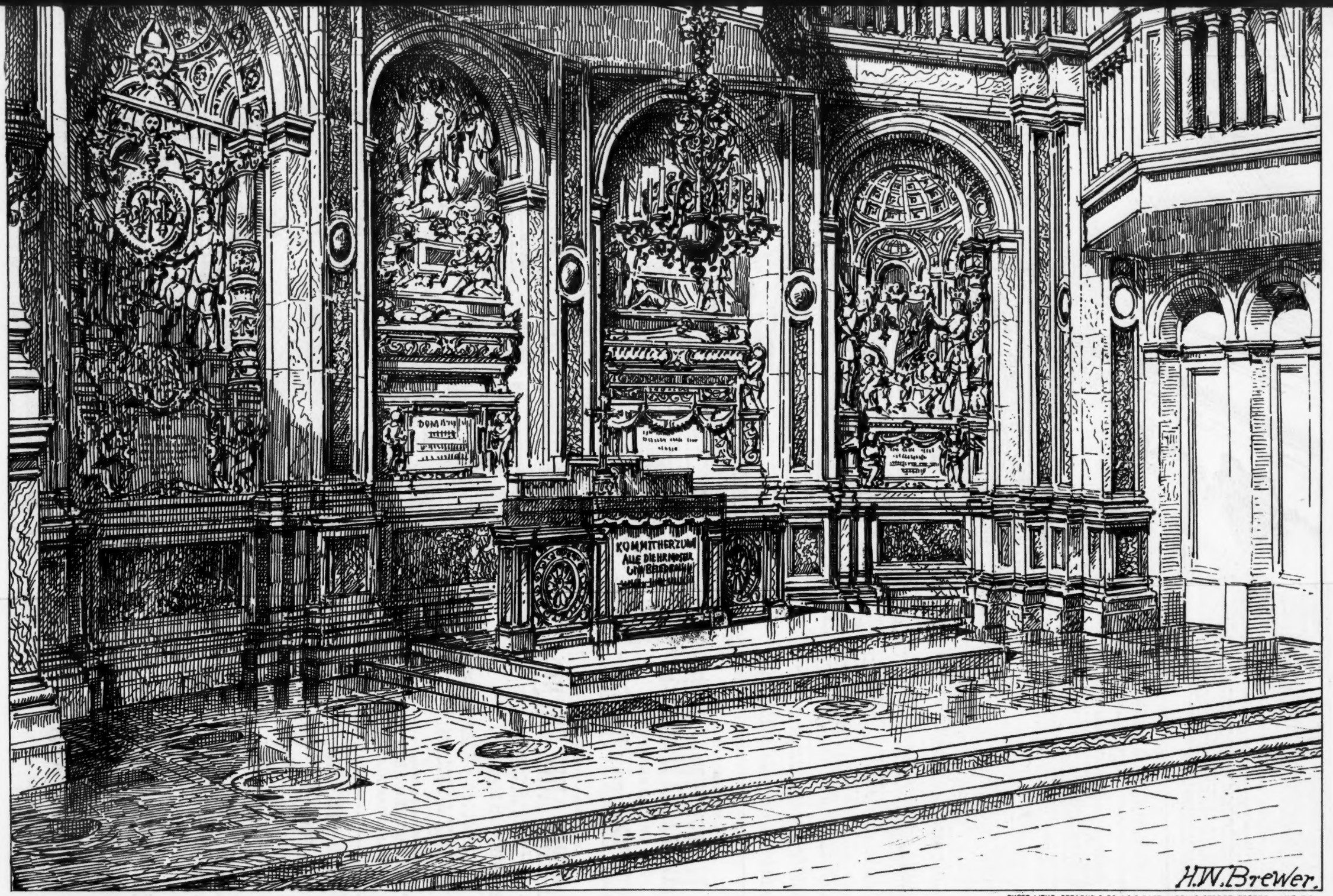

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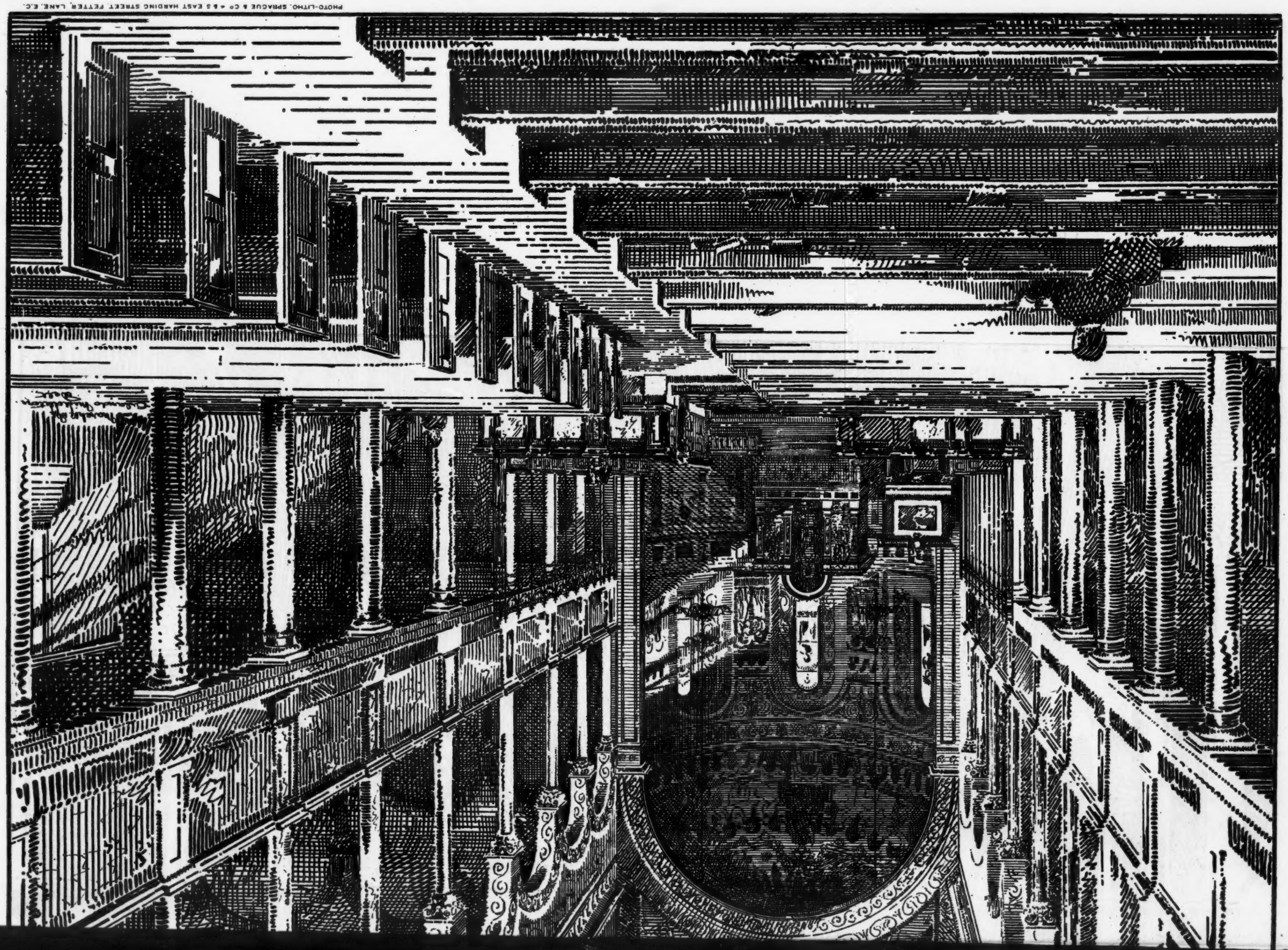

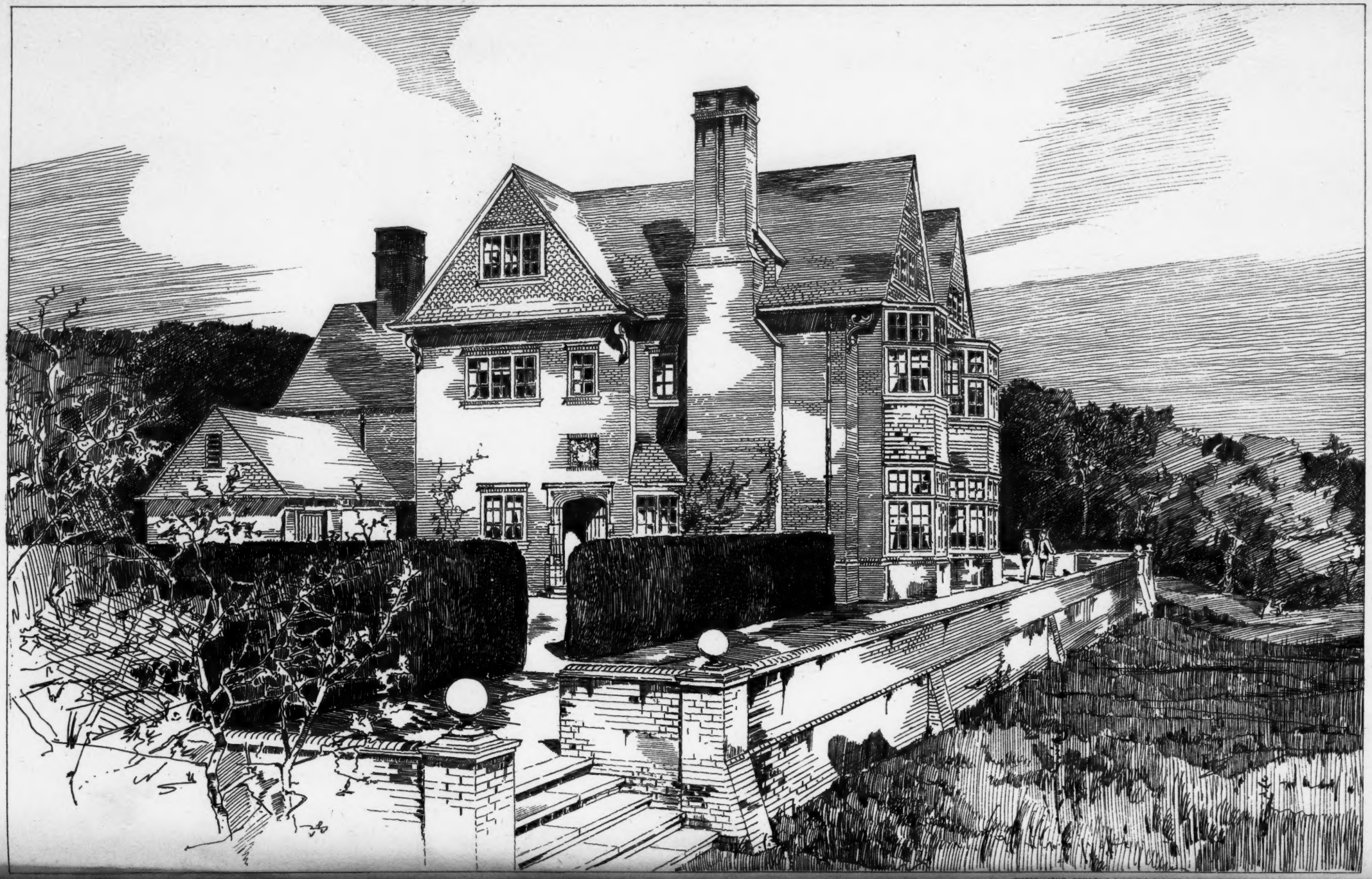

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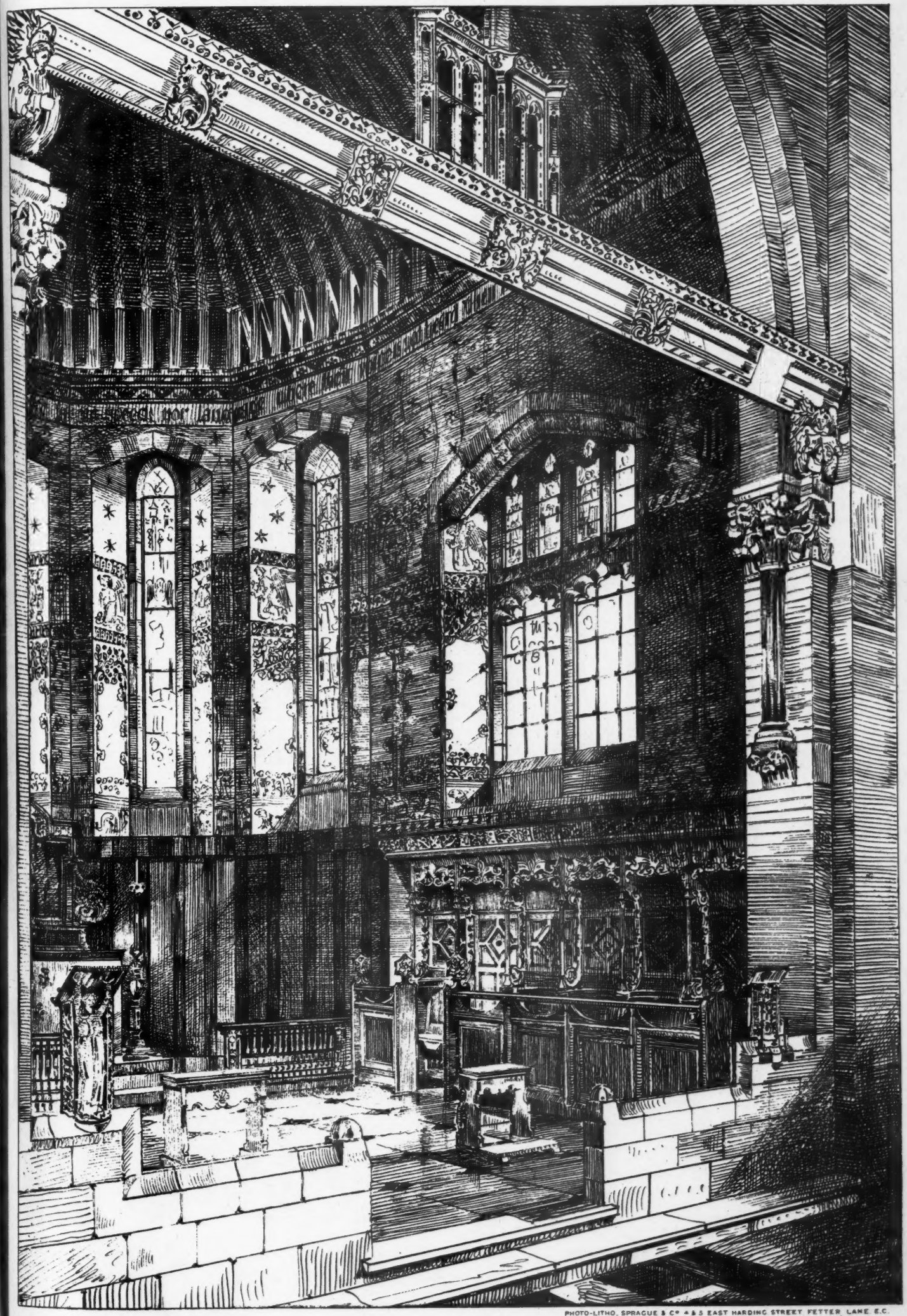

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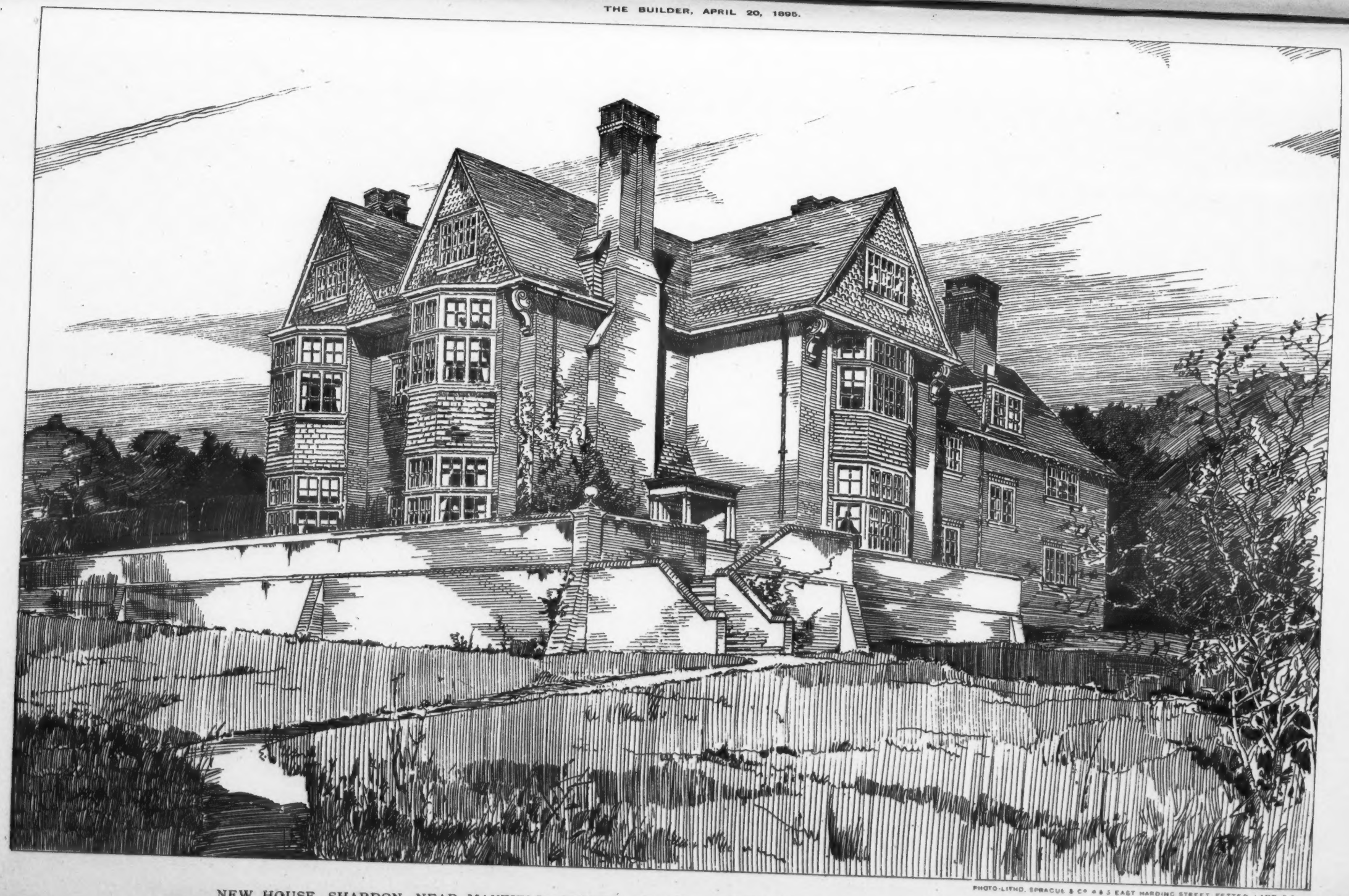
NEW STALLS AND DECORATION TO CHURCH, PYE STREET, WESTMINSTER,—Mr. John Belcher, F.R.I.B.A., Architect.



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